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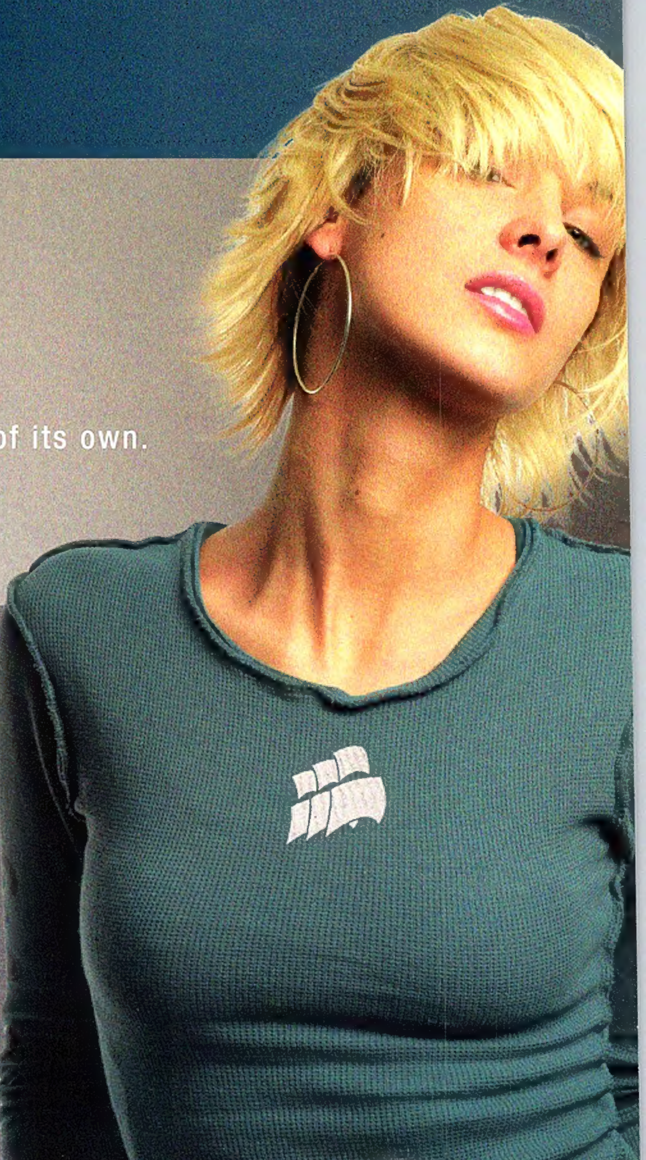

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EDHEAD

We've been everywhere...

You know, I'm starting to think that Atomic needs its own frequent flier account somewhere.

This year we've been to Las Vegas to cover CES, visited Blizzard HQ in California to get some hands on time with Starcraft 2, and in just the last month we've been to Taiwan for the Computex trade show, New York for Homefront and then to LA to take in the insanity of the Electronic Entertainment Expo.

Not bad for a little old outfit like Atomic.

The real kicker is that's just the start of our international coverage for the year.

Justin's literally just flown off to Warsaw – of all places! – to cover Microsoft's Imagine Cup, and beyond that there's a good chance we'll be hitting the Penny Arcade Expo, and maybe even QuakeCon.

Not to mention our usual reportage from Blizzcon (hear that Blizzard?).

I don't like to blow the Atomic horn... no, wait a minute, I LOVE to blow that horn... but I really don't think there's another title out there that delivers that kind of coverage. At least not in the local market.

And, with our excellent integration of print, online and other media (like our new podcasts), the kind of access you, the reader, get in turn is pretty comprehensive.

And speaking of our new podcast, we're now officially on iTunes, so just search for Atomic and you should be able to find us and subscribe - that way you'll never miss out on the inane banter... I mean... incisive commentary from myself, Justin and ex-Atomic writer John Gilloolly. Giloolly. Gillll...

Or John. Let's just call him that.

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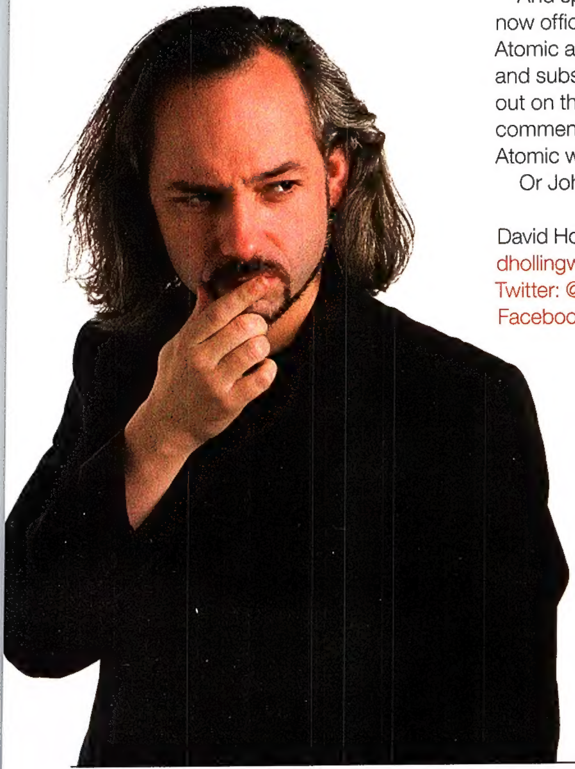

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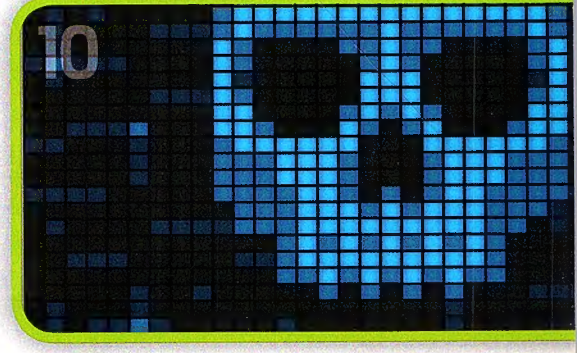

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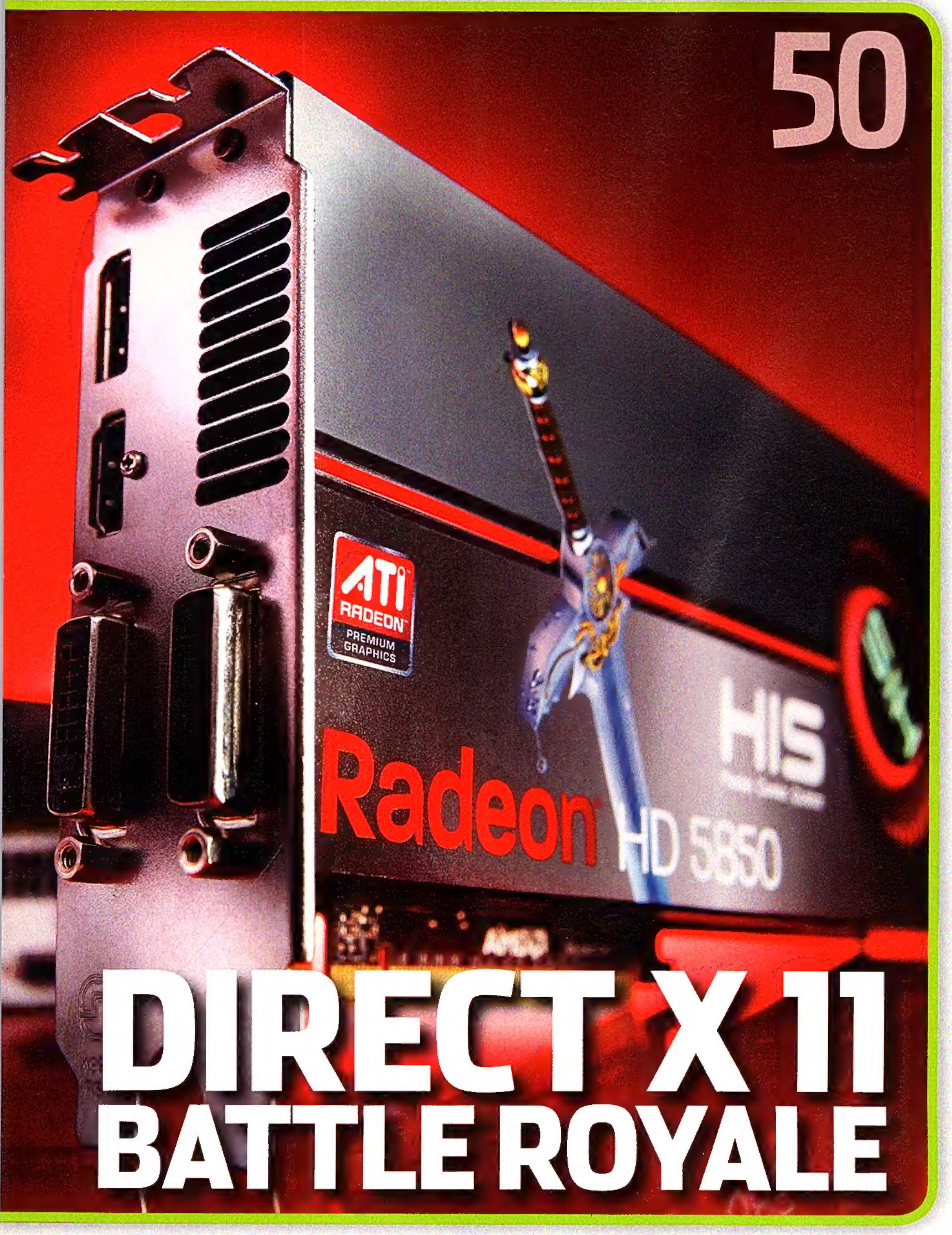

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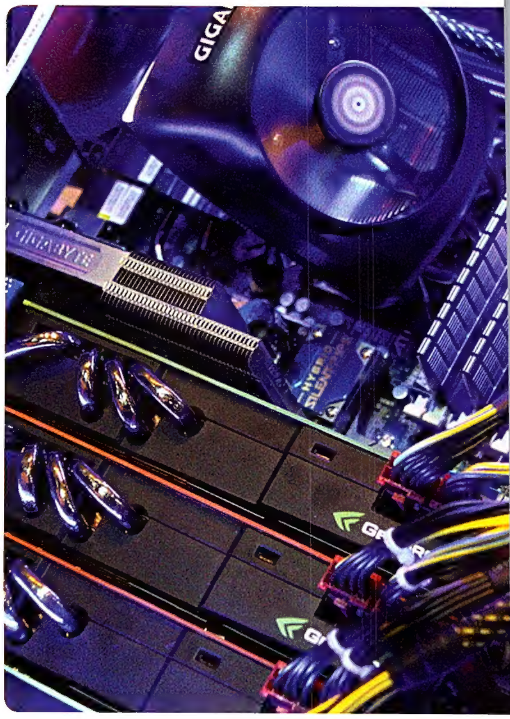

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Visa launches online micropayment service

Payclick aimed at digital content consumers

Visa has launched an online payment service for consumers of digital music, games and movies. Designed and developed in Australia, payclick by Visa is an online account for teens and consumers of low priced downloadable content - typically online transactions under $20.

Market research firm, Investment Trends has found that online micropayments in Australia will reach $646 million during 2010. Once registered for Visa payclick, consumers can purchase content from participating websites.

From today, BigPond Games, BigPond Music, Flexischools, Habbo, iTunes and Kids Helpline will accept payclick payments.

Greg Storey, general manager for payclick at Visa, said security was an important consideration in the development of the service.

The service means consumers don't need to share their personal information or bank account details with merchants. Instead they need to validate their transaction by typing in their password.

Storey said Visa wanted to "meet an unmet need" and target a particular niche and consumer segment.

Payclick accounts are suitable for the different needs of family members, according to Visa.

For teenagers, Storey described the service as "pocket money online". To open a primary account users must be 18 years or over.

However, a key feature is the sponsored account for teens, which allows teenagers to pay for their purchases online while parents manage their accounts' funding and have a transparent view over all transactions.

The account can be funded through Visa, Mastercard, online banking and Bpay. The opening balance is capped at $1000 and the minimum is $20.

"We've been working here on this service for two years," he said.

The service is available now in Australia. Visa did not give an indication as to when and if it will be rolled out globally.

Storey said consumers don't get charged a fee but merchants are charged a "competitive fee" to use payclick.

Portal 2 announcement excites expectant fans

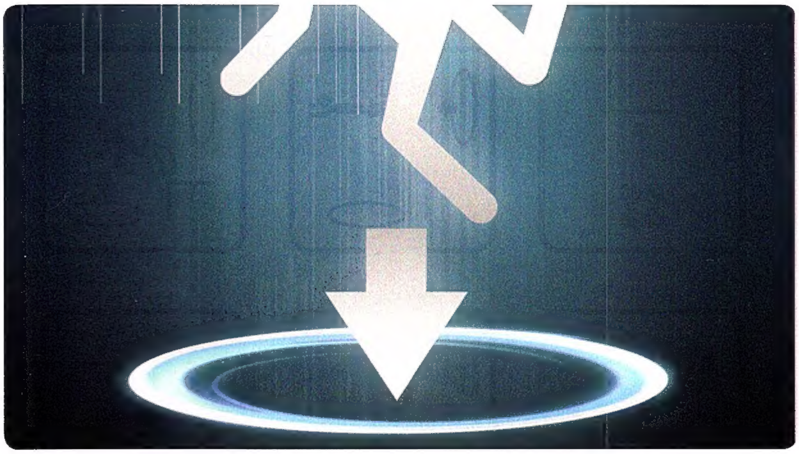
Can Valve and Portal 2 bring us back to the Aperture Science labs even better than before?

It doesn't take much from Valve to get the fans of its Portal game stirred into a frenzy - and there's no better way to do it than with a brand-new teaser trailer for Portal 2.

It's got all the things you know and (hopefully) love from the original Portal game, including a very creepy GLaDOS and a look inside the decrepit testing facility that you once called home.

A jungle setting certainly seems like a bigger challenge compared to the rather pristine environments of the first, and the budget for Portal 2 appears to be massive - just check out those complex animations!

Also hinted at by Gabe Newell, co-founder of Valve, was that the PlayStation 3 version of the game will be the best of the console versions, and will even support Valve's Steam Cloud service; giving access to saved games from any console on the 'net.



FROM ATOMIC ONLINE

Another month down the tubes, another month of shenanigans, various and diverse, on the Atomic forums. And with shenanigans comes awesomeness, and with awesomeness comes...

The Post of the Month.

(That could be the other way round, but we're not sure)

So who gets the big prize this month, which, for the time being, is a six month subscription* to Atomic? SledgY, for his wonderful coding effort. At one and the same time it manages to be helpful, generous, knowledgable, and geeky. Plus, as mentioned, awesome.

http://forums.atomicmpc.com.au/index.php?showtopic=31805&st=0&p=644161&#entry644161

And we have two top runners up.

Chuck's gaming thread generated a nice little discussion in PC Gaming.

http://forums.atomicmpc.com.au/index.php?showtopic=32728

While seehund went to a lot of effort for this post.

http://forums.atomicmpc.com.au/index.php?showtopic=32146&st=0&p=647823&#entry647823

Tops work all round, folks. Give 'em some Atomic flavoured love! Huzzah!

POTM

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Kingston 64GB SDXC UHS-1 Class 10 Memory Card

Price: $595 **Website:** www.kingston.com/anz

Back in my day, the biggest memory card you could get for your digital camera was one gigabyte. That let you take a couple hundred high-quality photos, which seemed like heaven after growing up on film.

Remember film?

Remember paying eight dollars for a roll of film that let you take two dozen photos you couldn't even see until you paid another fifteen dollars to have them developed?

No? What?!

Get off my lawn! Damn kids!

Anyway, us oldies are blown away by just how many photos you can fit on this 64GB SDXC card from Kingston, as well as the very impressive transfer (10-60mb/s) and read/write (35mb/s) speeds.

SteelSeries Starcraft II Mats

Price: $30 **Website:** www.steelseries.com

If you're new to Atomic, we feel it's fair to warn you: we're a bit excited about Starcraft II. So excited we've put it on our cover twice, and it's not even out yet. It does help that Blizzard are releasing some mighty fine artwork to whet our appetites. And now that SteelSeries has released this range of limited edition mousemats, we're glad to see that we're not the only ones that think so.

These mousemats have all the usual SteelSeries bells and whistles, including a high quality cloth material and optimized textured surface, and a non-slip rubber base, so they won't move around. But mostly, they just look awesome.

Awwwwww yeeeeah.

LaCie Rugged USB 3.0

Price: $259 **Website:** www.lacie.com/au

Random fact (thanks to Sam, our awesome product manager): black boxes on planes are not black. They are orange, because orange is the most visible colour in the world.

Also orange: this LaCie external hard drive.

It's also USB 3.0, so it has a speedily fast maximum transfer rate of 110MB/s.

And it's so rugged that you can hold it above your head and drop it and it should survive, although LaCie recommends unplugging it before testing that theory, not least because the same may not hold true of the attached laptop, should you fail to do so.

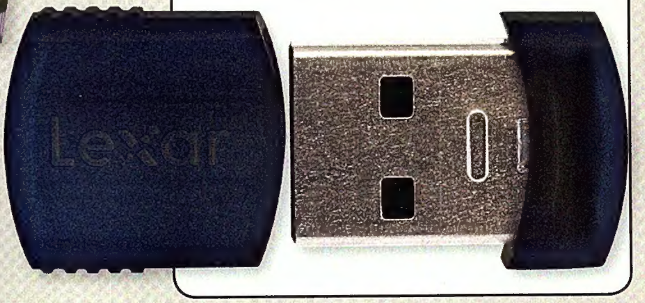
Did we mention it was orange?

Lexar Echo ZE USB Key

Price: $148.45 (32gb) **Website:** www.lexar.com

A wise man once said: you can never have too many USB keys. We tend to disagree - there's something infuriating about not remembering which of your thirty USB drives you saved that Very Important File™ onto.

A wiser man might therefore say that you should stick to a smaller number of good quality, high-capacity USB keys. Example: this one. It's all rubbery and durable and will carry around up to 32GB of your Most Important Files™. It's teeny tiny too – only 20mm long – so it'll fit just about anywhere, including down the back of the couch or into that annoying slot between the back of your desk and the wall. Perhaps not ideal for the lose-head-if-not-screwed-on crowd.



PocketBar

Price: $114.40 **Website:** www.urbantool.com.au

Another month, another iPad accessory (yes, yes, we know, but despite wanting so much not to want one, we want one – so shiny and so surprisingly nice to type on), but you can almost pretend this one isn't.

The PocketBar works for just about any netbook, along with your keys, cards, MP3 players, pens and junk, and can be worn as a traditional shoulder bag, across the body or holster-style, so you can keep your iPad close to your heart wherever you go.

It's even got a carabiner, for instant cred with mountain climbers and outdoor geeks alike.

Going viral

Jake Carroll finds out where internet viruses came from, and where they're going.

Remember those LAN nights we'd have as kids? There was always one guy who'd bring some horrible box onto the network infested with all the horrors of the Internet. Everyone would play C & C Generals for three hours, pizza would come, and then shortly after, everyone would be up for a reinstall because the systems were all riddled with blaster.exe and other wonderful DCOM exploit misfortunes of the script-kiddie era. Good times.

We have a ticket this month into the nasty world of virus creation, infectious exploits and generally, malicious code. Nothing could be finer.

Where did we go wrong?

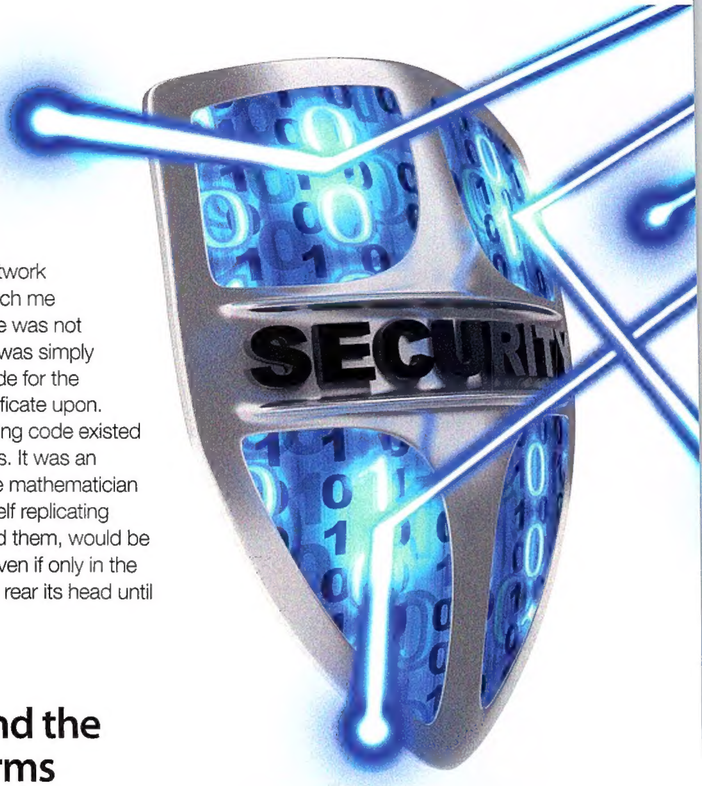
You have to wonder how we got into this situation. The Internet is a hostile place these days. It seems to imitate life in many respects. Bullying, terrorism, cults, and profound stupidity abound, but these somehow manage to coexist with culture, creativity, intelligence and a sense of global community.

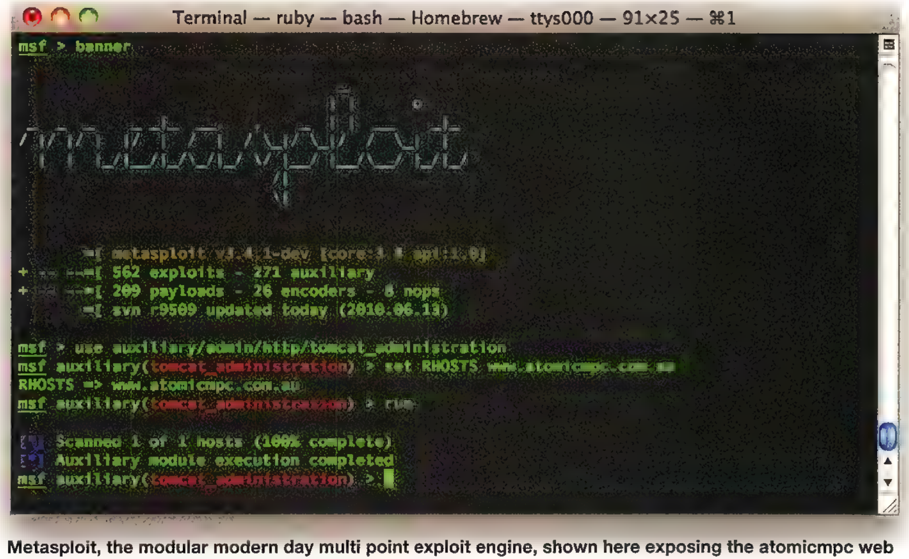
The first known case of this intelligence unfortunately combined with the wonder of online communications came from the very organisation that created the Internet, namely, ARPANET in 1971. On one faithful day in August (the exact date of release is debated), the 'Creeper' virus was released to ARPANET, designed to infect and target DEC PDP-10 systems running TENEX OS. Creeper was interesting because it didn't actually do any harm, as a bit of mobile code that simply popped around the network printing "I am the Creeper, catch me if you can!" – which at the time was not even considered a virus. This was simply a demonstration of mobile code for the academic community to pontificate upon.

The concept of self-replicating code existed before any modern computers. It was an idea dreamt up in 1949 by the mathematician John von Neumann. These 'self replicating automata', as Neumann called them, would be the precursor to something (even if only in the theoretical form) that wouldn't rear its head until the 1980s.

First wave: Early viruses and the concept of worms

In 1983, a graduate student of USC named Fred Cohen wrote and demonstrated the first





```
msf > banner

       =[ metasploit v3.4.1-dev [core:3.4 api:1.0]
+ -- --=[ 562 exploits - 271 auxiliary
+ -- --=[ 209 payloads - 26 encoders - 8 nops
       =[ svn r9509 updated today (2010.06.13)

msf > use auxiliary/admin/http/tomcat_administration
msf auxiliary(tomcat_administration) > set RHOSTS www.atomicmpc.com.au
RHOSTS => www.atomicmpc.com.au
msf auxiliary(tomcat_administration) > run

[*] Scanned 1 of 1 hosts (100% complete)
[*] Auxiliary module execution completed
msf auxiliary(tomcat_administration) >
```

Metasploit, the modular modern day multi point exploit engine, shown here exposing the atomicmpc web frontend to a Tomcat exploit in three simple commands.

virus in Microsoft's DOS. Known as Brain, it was an attempt to obscure and cloak the presence of bad code by simulating all of the DOS system calls that normally alerted the system to problematic or potentially unstable runtime. It made a powerful proof, showing that all is not as it seems on an infected host. Activity displayed on a screen might be fabricated or falsified, and not match the reality of what a host is actually doing. This was the first time the concept of mistrust in computing was observed.

In 1987 the 'CHRISTMA EXEC' virus was, according to all reasonable sources and research, the first virus spread via email. Email then was a very primitive concept, and in this instance caused a large IBM mainframe-centric infection. This virus was also the first instance of a social-engineering mechanism, as the user was tricked into running an executable file with the lure of having a pretty Christmas tree graphic drawn on screen. Once the graphic was rendered, it then sent itself to all other recipients in the users address book. Thus, the email chain virus was born.

The now immortalised 'Morris worm' attacked 6000 systems in eight hours in 1988. Comically, at that point in time this was around 11 per cent of the entire Internet. The motivation behind the construction of this virus is rumoured to merely explore the depth of the Internet at the time, but its effects were clear enough. It was not designed with the intention of malicious destruction. Embarrassingly, its destructive nature in shutting down systems was due to programming mistakes and poor code. This was an example of the first virus to use a buffer overflow attack through a trivial vulnerability found in the UNIX 'Finger' binary. It went a small step further in 1989 with the unfortunately named WANK virus (Worms Against Nuclear Killers), which learnt well from the Morris virus and used a combination of buffer overflow exploits and email propagation mechanisms.

Second wave: Polymorphism and tools of the trade

The coming of the second wave, as many experts consider it, started in 1990 with high virus activity and lower worm distribution. Technical complexity of viruses would go on to have a direct impact on the effectiveness and capabilities of worms. Viral activity leapt from MS-DOS to Windows and cross-platform macro virus activity was detected. Email infection became the mainstay of virus propagation towards 1995 and the concept of polymorphism came into being.

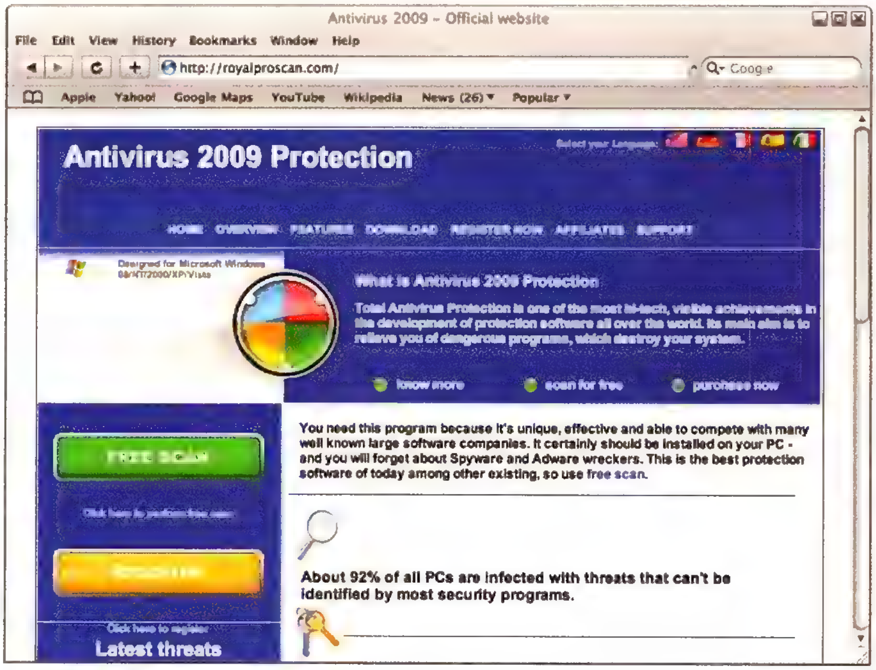
> ...the user was tricked into running an executable file with the lure of having a pretty Christmas tree graphic drawn on screen.

In the late 80s, end-to-end encryption was put to work for malicious code creation. The idea was that one could mask or scramble the 'code signature' of a virus so that security software couldn't detect and delete it. The simplistic method used for detecting viruses of a known type was simple checksums. If the bit pattern was validated against a known sum, it'd be considered a virus, and deleted. When a virus learnt to maintain many bit patterns and unique global checksums as a result of encryption and decryption keys, it became very difficult for a virus scanner to make a decision about whether or not a file was indeed malicious. The concept of polymorphism took this a step further, making it possible for the virus to continually permute the body of the attacking code. This behaviour was first reported in Germany in 1989, though conjecture by several security response teams suggest it was reported as early as 1988 at Oxford University. The virus in question replicated by injecting a random number plucked from a typical host based *rand()* function into a byte generator. Unfortunately, this meant that there was no commonality between any given infection, and if there could be, it would only result by the *rand()* function generating the same data.

The concept of the toolkit was gestating when, in 1992, a well known but tragically named hacker (Dark Avenger) authored a self-styled end user 'Mutation Engine' allowing any user to plug in their own code to mutate their virus with limitless permutations. Pathogen, Queeg and SMEG (Simulated Metamorphic Encryption enGine) are among the most prevalent of these engines documented.

The ultimate achievement of the virus creators was the 'Virus Creation Lab' that was an intuitive, user friendly GUI that allowed an end user to generate malicious binaries with no programming capabilities. This was exemplified in the mass media in 1991 by the Anna Kournikova virus. The harmless JPEG promising a provocatively dressed tennis star would turn up in an email, but when opened would run a Visual Basic macro, sending itself to every person in the hapless victim's MS Outlook address book. Shortly after this, Outlook got smart and MS went on the offense to prevent this kind of continual behaviour. Unsurprisingly, the general

public got wise to it and macro virus attacks in email as the vector dwindled in popularity.



What is Antivirus 2009 Protection

Total Antivirus Protection is one of the most hi-tech, visible achievements in the development of protection software all over the world. Its main aim is to relieve you of dangerous programs, which destroy your system.

You need this program because it's unique, effective and able to compete with many well known large software companies. It certainly should be installed on your PC - and you will forget about Spyware and Adware wreckers. This is the best protection software of today among other existing, so use free scan.

About 92% of all PCs are infected with threats that can't be identified by most security programs.

Antivirus 2009: Yo dawg, we heard you like virus scanners, so we put a virus in your virus scanner that infects itself with viruses while you scan for viruses.

Third wave: Mass e-mailers

The mass use of email attack vectors was on the rise through 1999 to late 2001. Common worms such as Happy99/Ska moved through networks over email, but then (on NYE) modified the user WSOCK32.DLL with a very clever bit of code commonly known today as a Trojan Horse. We all know the tale from the Trojan War, as told in The Aeneid and by Quintus of Smyrna. Long story short, a big wooden horse was brought inside the city walls after being offered as a gift – but the horse was actually full of nasty Athenians, just waiting for the Trojans to retire before they jumped out and attacked. It was a cunning disguise that brought down a kingdom, and Trojans in computing terms are no different. They pretend to be something else – useful, common and expected – but serve a darker purpose. Unfortunately for the end user, the infected WSOCK32.DLL would send a secondary copy of an email to every user in an address book silently, thus continually spreading the Trojan and payload.

In quick succession, the media-over-hyped Melissa virus infected near 120,000 hosts in three days in March/April of 1999. Its premise was an email promising usernames and passwords to erotic websites. The attachment in the email was simply a word document with a malicious macro embedded. Love-Letter, Bubbleboy and the Hybris worm all escaped into the wild by the year 2001 inflicting similar pain and network outages, but on a much larger scale.

Fourth wave: Warfare and the modern worm

Generally regarded as having started in 2001, these exploits are highlighted by worms such as Nimda and Code Red. They have a few vital characteristics that make them a 'modern' threat, in that they are not simplistic singular-vector or payload-related anymore. This level of complexity includes:

- Multi-modal or 'blended' attacks, using various infection vectors.
- Instant Messaging based infection methods, P2P based replication spread across BT/LimeWire et al.
- Active and destructive to antivirus software mechanisms.
- 'Hot code' updates from the Internet. Just like virus scanner definition updates, the viruses download updates for themselves too!

Current developments

On August 12th 2003, the beginning of the current generation of viruses was heralded when Blaster and SoBig.F worms hit the scene.

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- GIGABYTE OC Guru – Graphic Card Smart Tuner
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GV-R577SO-1GD
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- GIGABYTE GPU Gauntlet™ Sorting Technology
- Core Clock: 900MHz (std:850) / Memory Clock: 4800MHz
- Intrgrated with 1024 MB / 128-bit GDDR5 video memory
- GIGABYTE Ultra Durable VGA High Quality Components
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Targeting the MS DCOM RPC, the virus ripped around looking for a listening port on TCP 135 on WinXP and Win2k/3 hosts which, at the time, had no obviated exploits transporting on this port. The net effect of this set of worms and viral behaviour was a swath of personal firewall development from companies such as ZoneAlarm/Zone Labs, and, to a greater extent, the hardening of WindowsXP with a user-side firewall through SP1/SP2.

Jump ahead a few years and we've seen many similar permutations bouncing around, but none really that different until very recently.

A new wave of software, when combined with naivety, has been found to be a tidy mechanism for infecting systems and then having them act as a distributed bot system, or bot-net. Examples of this are the new Antivirus scanners that are in fact viruses and entire virus distribution mechanisms. Such examples are 'Antivirus Protection 2009'.

Getting a step closer to the kernel is the rise of rootkits. A rootkit is a tool that allows a user, group or entity to gain administrator level privileges on a host. Rootkits can exist in BIOS, boot loader, hypervisor, or kernel and uncommonly in libraries. No OS is safe from them. Found in the wild operating on Linux, Mac OS X, Windows 7 and Solaris, even the high-end hardened UNIX systems are at risk. In recent history the rootkit has put large companies under scrutiny, with the Sony/BMG scandal of 2005 causing the corporation's reputation a great deal of damage. The Sony/BMG rootkit, designed by Fortium Technologies, silently installed a backdoor onto a host when attempting to play certain music CDs in an attempt to enforce a form of DRM. This backdoor allowed anyone with the prior knowledge of the rootkit to gain unlawful access to the infected host. Sony/BMG conclusively lost a class-action lawsuit brought about by these irresponsible actions.

Security software at work

Virus scanners have for the most part evolved out of need and research. Current generation scanners have a few tricks up their sleeves within their key components:

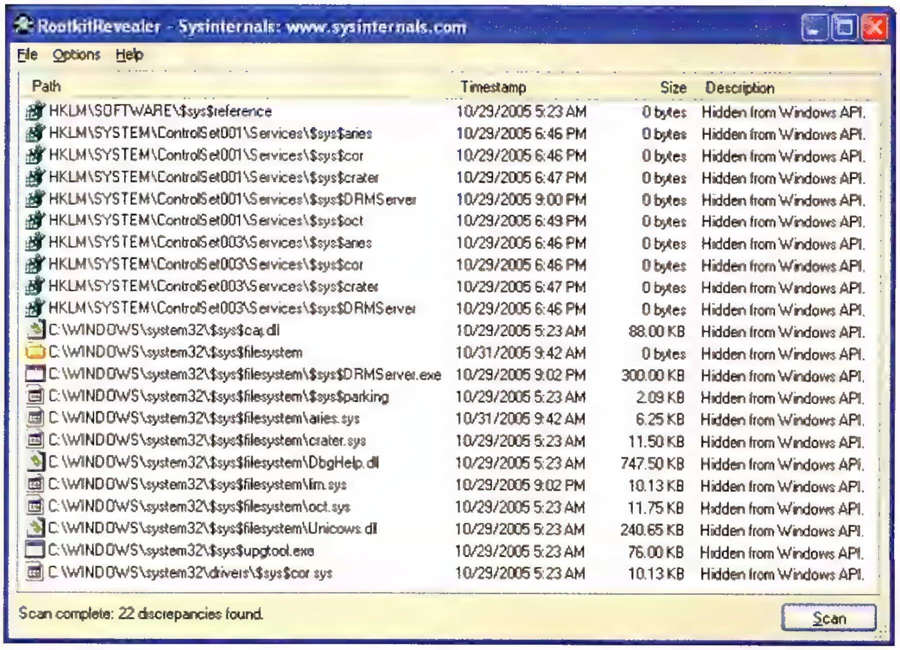
- Updated definitions, to load new intelligence on demand about new exploits.
- Anti-tamper mechanisms to prevent viruses from turning off/damaging virus scanner binaries, libraries and code.
- Heuristic scanning mechanisms.
- Memory load point inclusion scanning.
- CPU level integration with NOP/NX commands.

Virus scanners in the current era are considered to be significantly less effective than before 2007. False positive effects are becoming more common with many commercial products, and are perceived as more of a nuisance than a useful tool.

A larger challenge for virus scanner companies is the cloud-infrastructure protection scenario. Cloud viruses have come into being. With petabytes of unstructured data living in cloud infrastructure, the mechanisms might exist for potentially malicious code to 'scan' or 'stumble' cloud file systems, but this doesn't suggest that it's necessarily efficient or sensible. More concerning than putting virus scanners in the cloud is the way clouds are being used by those with malicious intent. With numerous examples of Amazon's EC2 being used as a password cracking service (**http://tinyurl.com/cloudpass**), a massively distributed bot-net and a Trojan feeder, it's fairly safe to say that the world has become a less secure place because of the scale, requirements and demands we have created for ourselves.

Just maybe, we're our own worst enemies.

Virus scanners in the current era are considered to be significantly less effective than before 2007.



```
Path                                                      Timestamp             Size       Description
HKLM\SOFTWARE\$sys$reference                              10/29/2005 5:23 AM    0 bytes    Hidden from Windows API.
HKLM\SYSTEM\ControlSet001\Services\$sys$aries             10/29/2005 6:46 PM    0 bytes    Hidden from Windows API.
HKLM\SYSTEM\ControlSet001\Services\$sys$cor               10/29/2005 6:46 PM    0 bytes    Hidden from Windows API.
HKLM\SYSTEM\ControlSet001\Services\$sys$crater            10/29/2005 6:47 PM    0 bytes    Hidden from Windows API.
HKLM\SYSTEM\ControlSet001\Services\$sys$DRMServer         10/29/2005 9:00 PM    0 bytes    Hidden from Windows API.
HKLM\SYSTEM\ControlSet001\Services\$sys$oct               10/29/2005 6:49 PM    0 bytes    Hidden from Windows API.
HKLM\SYSTEM\ControlSet003\Services\$sys$aries             10/29/2005 6:46 PM    0 bytes    Hidden from Windows API.
HKLM\SYSTEM\ControlSet003\Services\$sys$cor               10/29/2005 6:46 PM    0 bytes    Hidden from Windows API.
HKLM\SYSTEM\ControlSet003\Services\$sys$crater            10/29/2005 6:47 PM    0 bytes    Hidden from Windows API.
HKLM\SYSTEM\ControlSet003\Services\$sys$DRMServer         10/29/2005 6:46 PM    0 bytes    Hidden from Windows API.
C:\WINDOWS\system32\$sys$caj.dll                          10/29/2005 5:23 AM    88.00 KB   Hidden from Windows API.
C:\WINDOWS\system32\$sys$filesystem                       10/31/2005 9:42 AM    0 bytes    Hidden from Windows API.
C:\WINDOWS\system32\$sys$filesystem\$sys$DRMServer.exe    10/29/2005 9:02 PM    300.00 KB  Hidden from Windows API.
C:\WINDOWS\system32\$sys$filesystem\$sys$parking          10/29/2005 5:23 AM    2.09 KB    Hidden from Windows API.
C:\WINDOWS\system32\$sys$filesystem\aries.sys             10/31/2005 9:42 AM    6.25 KB    Hidden from Windows API.
C:\WINDOWS\system32\$sys$filesystem\crater.sys            10/29/2005 5:23 AM    11.50 KB   Hidden from Windows API.
C:\WINDOWS\system32\$sys$filesystem\DbgHelp.dll           10/29/2005 5:23 AM    747.50 KB  Hidden from Windows API.
C:\WINDOWS\system32\$sys$filesystem\lim.sys               10/29/2005 9:02 PM    10.13 KB   Hidden from Windows API.
C:\WINDOWS\system32\$sys$filesystem\oct.sys               10/29/2005 5:23 AM    11.75 KB   Hidden from Windows API.
C:\WINDOWS\system32\$sys$filesystem\Unicows.dll           10/29/2005 5:23 AM    240.65 KB  Hidden from Windows API.
C:\WINDOWS\system32\$sys$upgtool.exe                      10/29/2005 5:23 AM    76.00 KB   Hidden from Windows API.
C:\WINDOWS\system32\drivers\$sys$cor.sys                  10/29/2005 5:23 AM    10.13 KB   Hidden from Windows API.

Scan complete: 22 discrepancies found.
```

The Sony/BMG rootkit, caught red handed.

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OnLive lifeline

Should hardcore PC gamers worry about OnLive? **Ashton Mills** doesn't think so

In the future, you may not need to keep up with the hardware Joneses, at least for gaming. A new service in the states – appropriately called OnLive – now in public Beta, promises the latest hot new games to be played not on your humble computer, but their super-servers, and streamed directly to you. And all through your browser, no less.

Two things came to my mind when I first heard of this a while back (it's been in development for seven years): "brilliant idea" and "won't it suck?". Unfortunately we can't try the Beta here; it's limited to the States, and yes it possibly will suck for people like you and I. There are a number of limitations that the hardcore gamer might not want to swallow: maximum 720p resolution, increased input latency (due to the net), reduced image quality (due to compression, part of how it works its magic), no offline play, no mods for those that support them, and – if it's important to you – no ownership of the game.

> Two things came to my mind when I first heard of this a while back (it's been in development for seven years): "brilliant idea" and "won't it suck?"

But then, we're not the target market. It's for everyone else, the rest of the world, the casual gamers and normal people who think spending more than $500 for a gaming machine is a waste of money. Is it a good idea for them? Hell yes. And it could have benefits and promise to negate platform differences for the rest of us too.

For one, it will bring the ease of use of consoles to PC gaming, and that means more revenue for games publishers and more investment into PC games. Which of course we'd prefer to see, instead of the emphasis on consoles and ports to PC.

It also, of course, brings almost the entire realm of PC gaming to the Mac. This, combined with Valve's recent release of Steam for Mac (and with it a raft of games 'ported' to the Mac platform) means the Mac has just gained hundreds of titles almost overnight. No, not quite the flexibility of the PC and not quite the quality if using OnLive, but going from almost nothing to a catalogue that rivals the PC in the space of a few months is impressive.

All that remains is Linux. Given Mac OS X is itself built upon Unix, the ports that Valve has done are likely closer to Linux now than their originals, and with long-time support for the platform on the server side way back to the original Half Life, Steam for Linux is very likely around the corner. Add OnLive to the mix, if the company releases a plugin for the platform (which should be quite easy to do), and you might finally be able to use Linux as your main OS and fire up a quick game of Crysis 2 without hitting that reboot switch. You can bet OnLive has an army of Linux heads waiting to dive in.

But if nothing else, OnLive is a demonstration of the internet at work. Such natural flow and use of its resources to relocate processing elsewhere and simply stream bandwidth, the very essence of the net, is a natural fit. And as our society (here and overseas) moves to fibre, all the more eminently viable too.

However even if (or when) it comes to Australia, I'll be buying my games for the PC still. I have an SLI beast for the prime purpose of getting the most from my games, I love modding and the extensibility it provides, I certainly like being able to play when my link is down, and I like to own not rent my products. But then OnLive isn't made for me, it's targeted at my friends who look at my PC and wonder what planet it came from, it's targeted at the casual gamers that that sit down for an hour on the weekend to do something other than watch TV, it's targeted at the rest of the world that isn't a computing hobbyist. And they're a much larger market than we are.

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INPUTOUTPUT

Dan Rutter brings the answers to
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I/O OF THE MONTH

Snap, crackle and pop

I I have been meaning to do a massive backup of my CD music collection, but I recently realised the absolutely poor quality of MP3s. My brand new Sony bass-booster earphones revealed a crackling interference sound in every song that I had, even after attempting to mess with settings over numerous music appliances.

I was wondering what the best audio codec is to maximise quality (as storage is cheeeeeeap), and what's the best program to rip my music with?

Michael Conman

O Whatever your problem is, it's not the codec. There's no MP3 compression artefact that sounds like 'crackling interference'.

First, make sure the noise is not simple distortion from turning something up too far.

If you're plugging your headphones straight into the output socket on the back of a standard modern motherboard, then the mobo may not have enough output power to drive decent-sized 'phones to a reasonable volume. Turn the volume way down, listen carefully, and see if the problem goes away.

If it does, that's because the headphone socket is feeble. Get a whole new audio adapter that has strong headphone output, or a headphone amplifier to plug between the computer and the 'phones.

Similar symptoms can occur if somewhere in the internal hardware/software signal path you've got some slider, usually the main volume control, turned all the way up and another slider, like the old WinXP 'Wave', only one notch above zero.

If this doesn't help, and you've ripped the songs yourself, then you may have made a mistake there. Ripping too fast, some other config setting that doesn't work right with the drive you're using (any proper ripping program, like good old CDex, will let you play with a lot of options), or perhaps your optical drive that can't rip audio well at *any* speed.

If the files are on a dying hard drive then that could introduce garbage data that makes unpleasant noises. But if *all* of your music sounds bad, the drive would have to be so sick as to cause very obvious other symptoms. (The same applies to any data cable that's bad enough to create noticeable effects like audio corruption.)

I think the problem is much more likely to lie with some component between the audio data and your headphones. There are lots of sound-driver problems that create pops and crackles, as can half-blown amplifier chips and dodgy electrical contacts on the analogue side. Oh, and probably power-supply problems, too; all sorts of bizarre symptoms can be caused by a sick PSU.

Try copying some of the MP3s to completely different hardware – another computer, a standalone MP3 player, whatever – and see if they're still crackly there. If they are, then it's a data problem of some kind – bad rips, dying hard drive, etc.

If they now sound fine, though, then it's time to start hunting down the hardware that's adding the crackles to your perfectly-okay music files.

You can buy little USB 'sound cards' on eBay now for only a couple of bucks delivered. They've usually got a description like "3D VIRTUAL 5.1 CHANNEL SURROUND SUPER USB SOUND CARD", but they're all the same USB dongle with two 3.5mm sockets on the end. They don't have very good sound quality, but they're a lot better than you'd think for the money, and they work with the standard built-in Windows USB sound drivers. They're great for quickly adding better-than-nothing audio to sound-card-less computers, and for diagnosing problems like this.

If the crackles go away when you're listening through a $2 USB sound dongle, then the problem is probably with your computer's sound hardware. One or another driver update may cure it, or you may need a new sound card.

(If the $2 USB sound doodad sounds good enough to you, then just use that!)

I/O OTM

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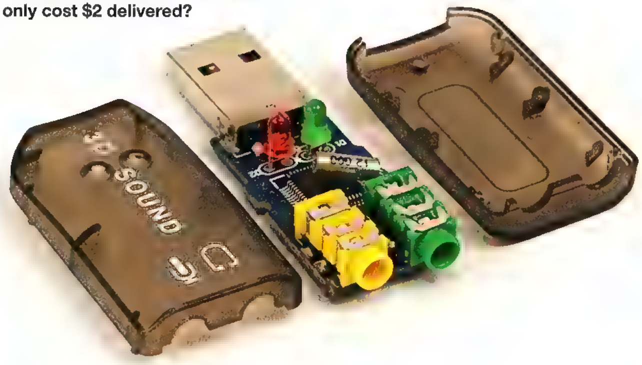
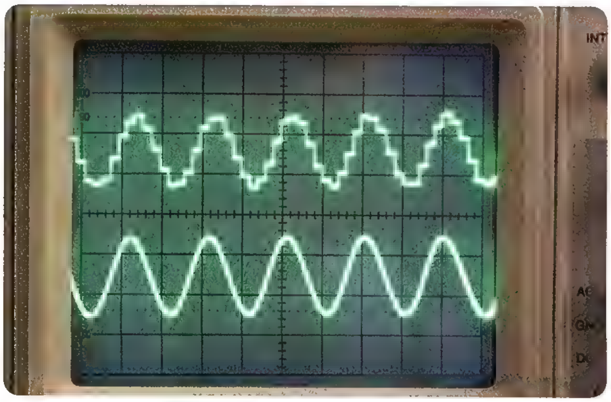
Why does this USB 'sound card' only cost $2 delivered?





Because it does *this* to a 10kHz sine wave!

Flashing to conclusions

I Last week I purchased an 8GB Corsair Flash Voyager, to replace my aging 1GB SanDisk Cruzer Micro. All was fine with it for a while; it actually surprised me at how fast it read/wrote. But now I think it is dead.

While I was copying a Uni assignment to it, the drive stopped copying, and the "Delayed Write Failed" error came up. When I tried again, it would not even start to copy. So I removed the drive, only to find when I plugged it back in again that the drive name was back to the original "Removable Disk", it was formatted to some RAW filesystem, and it was now read-only.

I tried formatting it by right clicking on the drive in My Computer, and also through Disk Management (in Computer Management), but nothing I did would work.

I'm not sure what else to do. Should I should keep trying to fix it, or send it back for a replacement?

Stephen Murray

O The world of Flash-RAM storage is in a sad state, I tell you. When Stephen sent me this, I assumed that the errors meant that he'd bought himself one of the countless fake Flash devices that're on sale on eBay and other flea-markets at any given time: **bit.ly/fake-flash**

(It's a classic Market For Lemons situation - **dansdata.com/gz086.htm**)

You may know the drill with these things: The sticker says 8GB or whatever, and that's the size the device reports itself as too. But there's actually only something like 512Mb of memory in it. When you run off the end of the memory that actually exists, it's Horrible Error Time.

As it turned out, though, Stephen had a *genuine* Corsair USB key, bought locally, that was simply and honestly broken. He got a warranty replacement, and all was well.

And boring.

So let's pretend he got scammed. How do you tell if you've got a fake Flash device – thumb drive, memory card or possibly even SSD?

Well, just copying a ton of stuff onto it as soon as you get it will do. Don't wait until you actually need to fill the drive to its sticker capacity – fill it up right away, remember the last files you copied onto it, unplug it and plug it back in again), and try to access the last files copied. If they're okay, the device is very probably genuine.

For a more rigorous, automated test, use C't magazine's 'H2Testw': **bit.ly/h2test** (Web-page in German, software bilingual.) It's a very handy little utility for this purpose, and also for seeing if that ancient 8MB thumb drive you dug out of the couch cushions is still functional.

It'll take FOREVER for H2Testw to completely test a fake '8GB' device, because failed write-and-verify cycles take a lot longer than successful ones. I give you permission to abort the test after only the first few hours of errors.

It's possible to fix the firmware of at least some fake Flash devices so they report their (low) capacity honestly, and work. Here's a blog that talks about this: **bit.ly/fixfakeflash**

Medium-screen TV

I Is it possible to connect a HD Set Top Box to an LCD monitor through an HDMI connection? And would I get sound if the LCD monitor had inbuilt speakers? I was considering a BenQ E2420HD connected to an Olin HVBT-2000B.

Stephen Quoy

O If the STB has an HDMI output and the monitor has an HDMI input, and the monitor can sync to the output resolution (and refresh rate) of the STB – which the spec-sheet for the E2420HD says it can – then it should work. Even with audio!

When HDMI was young, monitors that supported it often didn't support HDTV resolutions, but now that's quite common. (As is proper support for HDCP Copy Control Crap, which used to be another common cause of black screens.)

If you've already got the monitor, you can eliminate doubts if you just take it to a shop, plug it into a display STB and see what you get. (This sort of thing was less practical when 21-inch monitors weighed 30 kilograms.)

You can also connect a PC monitor to an STB via any analogue outputs and inputs the STB and monitor happen to share, down to mini-DIN S-Video and RCA-plug composite video. You won't get even HD-ish image quality from anything less than three-wire component video, though.

cat /dev/hd5 | google_translate > /dev/hd10

I Do you have any idea how to convert a Windows 7 Striped software RAID on three disks to a RAID 5 hardware set with four disks?

The problem is I have 4TB worth of data on there that may be extremely difficult to back up.

Any ideas?

Ryan Leach

O I don't know of any utilities that'll convert a stripeset from software RAID to the format any particular hardware RAID controller uses. (Different hardware RAID controllers have different formats.) I wouldn't be at all surprised if there were several ways to, at least, convert the format of a stripeset while keeping the basic disk number and structure the same – heck, you can probably do at least some variants of this job with a very small shell script in Linux. But I, blessedly, have never needed to learn about it. And converting your 3-disk RAID 0 to 4-disk RAID 5 would be... challenging.

In regards to your 4TB of important data, I know I keep saying this over and over, but if that data is important to you, it should already *BE* backed up.

If you've got it on a RAID-0 stripeset (the only kind of striped volume available in non-Server versions of Win7), the death of any of the three disks will hose *all* of your data.

Okay, lecture concludes. A possible solution:

Determine whether you have sufficient computer-owning friends that they'd like to buy a total amount of storage adequate to temporarily store all of your data. Like, three 1.5TB drives, formatted capacity about 1400GB each.

Buy those drives, use them as separate devices or as a temporary striped or spanned volume to hold the data while you convert the original software-RAID drives to hardware RAID with one more disk. Then copy the data back onto the new RAID-5 set.

Now pass on the slightly-used drives to your friends, possibly along with a small fee for drive rental.

And then, back up your data properly, because RAID 5 is not a magical guarantee that more than one drive won't be fried by a lightning strike, nobody will break in and steal your computer, you won't accidentally instruct your computer to destroy your valuable data, et cetera.

Computex
The Ultimate Guide

Since its inception in early 1981, Computex has evolved into a long-running mainstay of the technology industry – quickly becoming one of the most anticipated events of the entire year. While it was originally named Taipei Computer Show, and later renamed to its catchier present title, Computex embodies the spirit of the entire industry and crams it all into a single week-long rollercoaster ride.

Previous years have seen shenanigans arising from SARS and the H1N1 flu, though this year was relatively sedate. 2009's show was a quiet affair as the world began feeling the effects of the global financial crisis, stripping back research and development budgets, which limited the number of products released significantly. The show has picked up again somewhat this year, but rather than game-changing technologies we're seeing much more of an evolutionary change.

Is this a change that will reap dividends for the companies showing off their wares? Will there be sufficient investment in creating cool bits for your beastly rig? Can companies still tug on your walletstrings and make you part with your hard-earned cash?

We find out in these very pages.

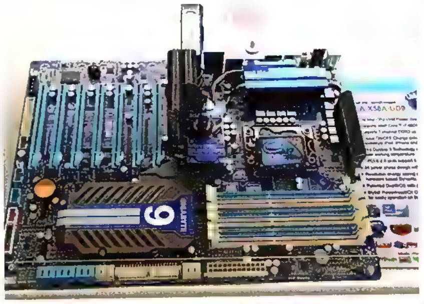
2010:

Justin Robinson reports on what the tech industry will be up to for the coming year.

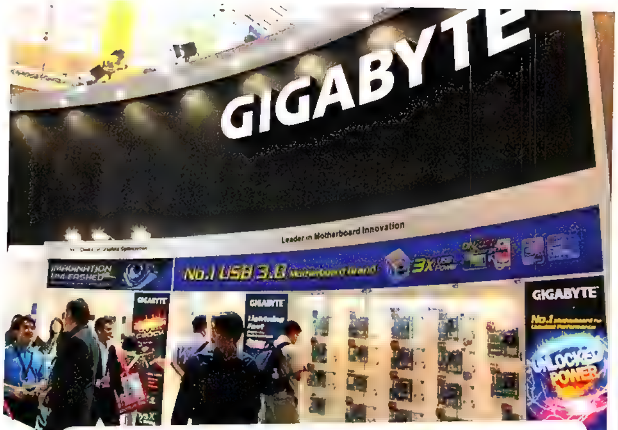
DAY ONE

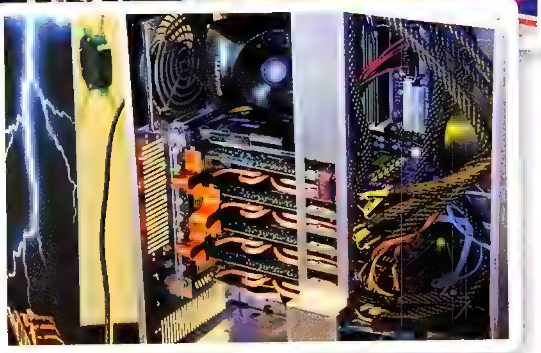
Hitting the ground at Taipei's international airport and jumping into the nearest taxi to the city, even the weather seemed a good omen for the show: bright and sunny, with just enough cloud to keep things interesting. It wasn't too hot, nor too humid, and everything seemed in perfect balance between all the possible sets of extremes that Taipei and indeed the entire industry can experience. After a forty minute ride to the hotel and a short pause to recharge, we headed off to the first stop of our Computex travels to meet with GIGABYTE.

First off, we'll say that without GIGABYTE we wouldn't have been able to make it to Computex this year, so we'll throw a big thank-you their way for helping *Atomic* get here! While most technology vendors elect to show off their wares at Nangang, a purpose-built exhibition centre a small distance from the middle of town, GIGABYTE elected to take out space in Taipei's famous Taipei 101 skyscraper. Though the building was surpassed in height soon after construction finished in 2004, the 101 stands at an impressive 509 metres – GIGABYTE took out the entire 36th floor.



A short vertical ride brought us to the entryway of GIGABYTE's most exclusive product space, showing off the entire range of products from the previous year and a good chunk of their current ones too. Most exciting was their X58A-UD9 motherboard; one that we'd spent some time online with in engineering prototype form (**www.atomicmpc.com.au/?172001**), but now finally finished and ready to be looked at. Specifications on this beast are a little ridiculous, boasting a power delivery system that uses a whopping 24 phases. How much power can 24 phases give you? Somewhere in the vicinity of fifteen hundred watts of power.





Think about that for just a second – that's enough power to run eleven and a half Intel Core i7 980X chips stacked one on top of the other, crammed into the same socket. It's enough to power ten 46" LED televisions at standard brightness, almost enough to get a Blendtec Total Blender going at full roar (the star of the "Will it Blend?" videos popular around the internet) and the board supplies 50% more power than your average George Foreman Grill.

You'll never ever (EVER!) be able to use this much power, as it's incredibly overengineered. Even more impressive is that the 24 phases

USB 3.0 is coming

It's not surprising that USB 3.0 is one of the biggest focuses of Computex – it's not called Universal Serial Bus for nothing. First released in 1996, the USB standard aimed at creating an easy-to-use interface that had widespread support for both devices and computers. Versions 1.1 and 2.0 hit in 1998 and 2000 respectively, by which time USB was already one of the only ports that any computer user could recognise and name, regardless of age or experience.

However, many years have passed since USB 2.0, and the industry is not slow by any measure of the word. The 480Mbps bandwidth, or 480 *million* bits per second, was simply not enough to cope with the data needs of even the humble USB flash drive, and mechanical media such as hard drives suffered underneath USB 2.0's too-small tubes. To top it off, USB 2.0 has a maximum amperage of 500mA, which may be enough to charge MP3 players but infamously isn't enough to charge some other devices (that may rhyme with "Flapple Thigh-Plaid").

USB 3.0 addresses these problems by boosting the theoretical bandwidth tenfold to 4.8Gbps, or 4800 million bits per second. This is roughly equivalent to 600MB/s, and though real-world speeds will be lower due to device and OS overheads, it is still plenty of bandwidth for any foreseeable use in the next few years. Power needs are boosted to provide 900mA of current, and 3.0 is even backwards-compatible with existing 1.1 or 2.0 devices.

We've seen it used in every new case design at the show, as well as in hard drive enclosures, hot-swappable caddies, notebooks and netbooks. It'll truly take off once Intel integrates the standard into their chipsets, which we're pegging as late 2010, though they've yet to confirm or deny anything. For now, keep your eyes out for that familiar rectangular USB port – because if it's blue, odds are that it'll be powered by USB 3.0.

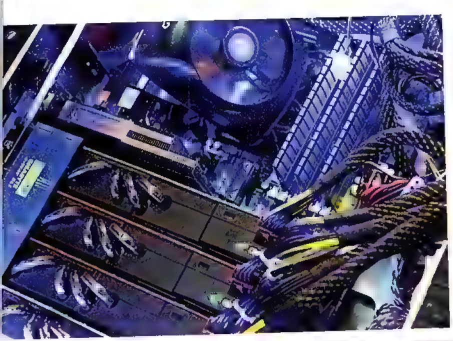
are split into two groups of twelve, and alternate upon each boot when power draw is underneath 750W, which describes every imaginable usage scenario, to save wear. It's almost like having two BIOS chips on your board for redundancy, but in this case it's slightly more extravagant – and it'd want to be, considering the $650 price tag. Amusingly this board is even cheaper locally than it is in the States by fifty bucks, but regardless of where you buy it, this is one board to be jealous of from afar. On top of all that, the UD9 does CrossFire and SLI as pictured to the left, and below.

We travelled downstairs to a nearby exhibition hall where GIGABYTE had a stand, but sadly there wasn't much else that was exciting: a multitude of USB3 products, some neat ITX motherboards, and a completely convection-cooled power supply. This PSU is rated for 90 PLUS Gold at 900 watts, but claims to be totally silent. There's no tech renaissance here, but based on their flagship products there'll be a very solid range of releases from GIGABYTE over the coming months.

A strong case of the 3.0s

The next stop took us out to Nangang to visit Thermaltake's stand, laden with all the products that have been reworked and designed for the next year. Based solely on the sheer amount of new products being launched this year, case manufacturing seems one of the biggest growth sectors in the market; and Thermaltake have taken it a step further by integrating not only USB 3.0 into their cases, but also integrating two hot-swappable SATA 3.0 hard drive caddies into the top of the V9 BlacX chassis. Every new design had USB 3.0, though like all other manufacturers at the show, this was achieved with an awkward pass-through cable that exits the rear of the case to plug into the motherboard.

Also shown off was an ITX version of the LANBOX range, squeezing an ATX PSU and USB 3.0 into a tiny little chassis with enough room in it for SLI or Crossfire, perfect for Lanning. The product that we were most impressed with of all the Thermaltake gear on display was the new entrant into their eSports range of peripherals: the MEKA G1 keyboard. The MEKA uses a mechanical system for the keys that gives them an excellent feel, has a speedy 1000Hz polling rate and is rated for 50 million keystrokes – most standard keyboards only last for five million. It's due to hit our shores in late September with a RRP of $149, though it'll inevitably be lower than that to purchase. Will it be worth it?



Thermaltake's Prototype Chassis

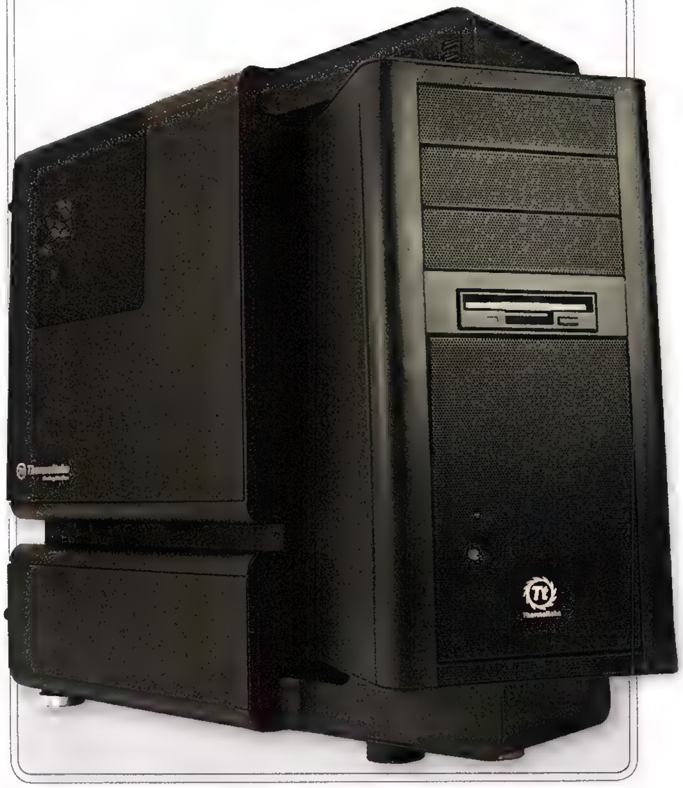
Co-designed by another auto manufacturer!

Thermaltake rocked our world when they released their Level 10 chassis last year, co-designed by BMW (and online at **www.atomicmpc.com.au/?166162**), and it's looking like they're preparing to do it one more time with feeling. We managed to sweet-talk our way from Thermaltake's booth to their top-secret headquarters, where we got our hands on the next project that you're seeing before your very eyes.

While it's still in a very early prototype phase, we can reveal that it's being designed by a car manufacturer – though this time it's *not* BMW. Physically the prototype chassis is crafted from steel, lending it a very sturdy build that borrows some elements from the Level 10: The major areas of the case are compartmentalised to manage heat; there's a fantastic curvature to most of the surfaces of the build; and it stands at a size that is imposing in even the largest room.

The biggest drawcard of this case is the rotating front pod that contains three 5.25in bays and a number of 3.5in bays – which are completely separate from the main ATX compartment. Cabling is run with special-length SATA and power cables through the top and bottom of the case, and the compartment as a whole can rotate to whichever orientation is most convenient for accessing the computer on a desk – then lockable to prevent unwanted movement.

It's looking like another superlative case already, and future refinements to the design will only improve this already solid build (though it already boasts USB 3.0 support). We'll be amongst the first in the world to get our review of this prototype chassis, and it'll all happen within the pages of Atomic. Until then, feel free to ogle.



DAY TWO

The start of the second day was every bit as bright and cheerful as the first. We had a chinwag with Antec last night about their new range of Dark Fleet cases, which certainly give a futuristic new face to the familiar Hundred-series chassis we know so well. It was a sedate enough affair covering small USB 3.0 updates, but like yesterday morning we're not off to Nangang first up – instead, we headed towards Taipei's centre once more. Situated in a Japanese restaurant was the ASUS Computex Motherboard and VGA seminar, a press briefing that promised to summarise all of ASUS' antics over the next year.

A big ol' toothy grin

Waiting to greet us in the entrance of the restaurant were two motherboards, one was the Immensity (as pulled out below), and the other was dubbed the Sabertooth X58. We've already seen the ASUS Sabertooth 55i motherboard based on the P55 chipset, but this is a new inclusion that uses the same ceramic-based heatsink material and applies it to the uncomfortably hot X58 chipset. While the ceramic didn't quite make a fantastic performance impression on us when we looked at the 55i, it does make the board look very visually interesting.

We moved into the restaurant proper and took our places around a stage, where we were welcomed by a magician, of all things. Usually we're quite fond of magic, but this magic man took far too long to perform his tricks, leaving us wondering why we were waiting at all. Of note was his second trick, involving an audience-driven noughts and crosses game that ultimately spelled out 'ASUS' when flipped over – impressive if the magician had somehow mind-controlled the audience into placing the pieces in the right places, but somewhat less so considering he flatly refused to place them anywhere but. Hrm. After an awkward twenty minutes that felt like three hours, the presentation kicked off with a simple message: 'Design Matters!'

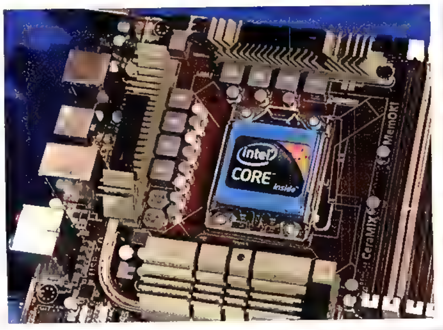
Snowballin'

The Immensity was introduced with a *Street Fighter* analogy that began "Ken fight with Ken, The result is hard to say", but threw a curveball with "what if Ryu came to help?"

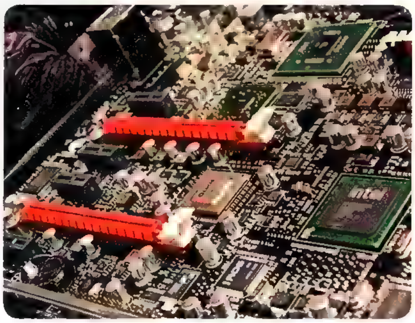
WANTED
• Performance King
• Dual Radeon HD 5870 with 4GB GDDR5
• 600% air flow special designed fan
• Oxygen-Free-Copper heatsink

It was a rather confused way of saying that ASUS are going to be integrating a GPU into their Immensity alongside a Lucid chip, but the presentation went on at length with vague analogies – and very few details. Indeed it was a trend continued with a comment from one of the presenters: "The ROG brand is so popular we should print it on tissue paper!" Perhaps not a great idea considering they mimed a toilet paper roll, knowing exactly where that ROG logo will be wiped. Shudder.

With the presentation over and done with we hunted down Kris Huang, the ASUS Motherboard Product Manager who spoke at our recent Insights night (**www.atomicmpc.com.au/?174037**), and got some solid information on the Immensity. On our way out the door we bumped into Lucid's co-founder Offir Remez, who described Hydra as a "seamless technology enabler" – a 65nm chip manufactured by TMSC that consumes barely six watts – and as Offir explains, "[the] possibilities are endless".



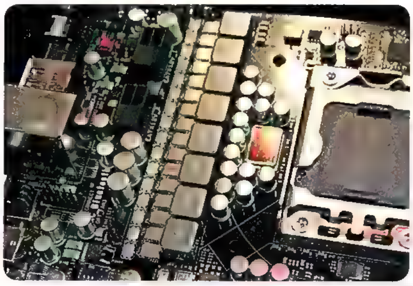
ASUS Immensity



ASUS are relatively infamous for creating wacky examples of tech – showing off their engineering prowess at the same time. We saw it in March of 2008 with their EAH3850 Trinity: a card that boasted not just two, but *three* RV670 cores for a total of 960 stream processors. ASUS have cooked up something really special for Computex this year, however, and they've dubbed it the Immensity.

To judge the book by its cover, you'd guess this board was simply an X58 Northbridge chipset with standard ICH10R Southbridge, a Marvell SATA 3.0 chip and NEC USB 3.0 chip thrown in for good measure and then call it done. ASUS engineers have pushed far beyond this now-standard high-end build, throwing a Lucid Hydra 200 chipset into the mix, specifically the LT22102. It takes 16 PCIe lanes and doubles them to 32, allowing either ATI cards or NVIDIA cards to be run concurrently at the same time – but the Immensity takes that concept even further.

Sitting in the middle of the board underneath an impressive heatsink is a fully-fledged RV870 core complete with 512MB of GDDR5 memory and its own power regulation, located underneath the DDR3 slots. We were told that it was a 5750, though **Hexus.net** was told 5450 and **Bit-Tech.net** got 5770. Regardless of the GPU, it'll be natively plugged into the Hydra 200 chip – requiring only a single graphics card to enable Crossfire, or a hybrid NVIDIA solution. We may never see the Immensity hit full-scale production, but it's certainly very novel.



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COOLall YOUR LIFE

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The New Toughpower XT series by Thermaltake offers users an advanced power supply solution, striking the perfect balance between reliability, efficiency and quality. With DC-to-DC voltage converter module, a 140mm cooling fan, S.P.T Indicator, FanDelayCool function and 80 PLUS® Bronze certification, the TPX-575M, TPX-675M, TPX-775M and TPX-875M are the ideal solutions for system builders and quality-minded enthusiasts alike.

- Single +12V rail
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- Life Time Warranty
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Xtreme Performance and Reliability

Lifetime Warranty
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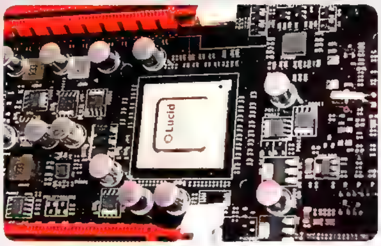
www.thermaltake.com.au

Lucid dreaming



The Lucid Hydra engine had so much promise when we initially heard of it in late 2009 (**www.atomicmpc.com.au/?152840**), though we've only seen it used in motherboards so far. It's an exciting chip that can take control of multiple graphics cards and allow either ATI or NVIDIA cards to run together to increase performance in-game in a decidedly Romeo and Juliet fashion, but it's finally now in mid 2010 that we're seeing it reach its potential.

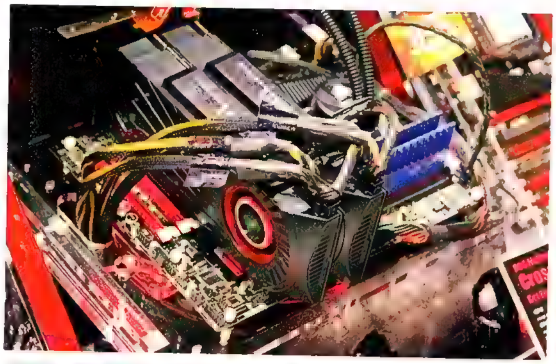
The first use we've seen for the Lucid tech is in their Adventure 2000 card, a PCIe 2.0 expansion board that allows multiple graphics cards to run in a single PCIe slot within a server environment – increasing GPGPU computing density markedly without the need to upgrade the server's motherboard.

While we've seen it used in a hybrid graphics card/motherboard (see p24), the Lucid chip also has potential to be used on a graphics card itself, interrupting the PCIe link *before* it reaches the GPU core and effectively behaving the same as if it were on the motherboard. This means we can potentially see a drop-in 5870 Lucid Edition card that'll play nicely with your existing GTX285 – and regardless of whether Lucid makes complete sense yet, it's an exciting technology to follow as it continues to mature.

High-speed custom interface

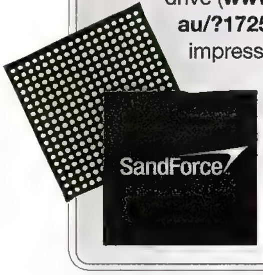
The next stop of our day was with OCZ, who had booked a suite in the Grand Hyatt hotel. While their range of SSDs remained the same as what had been on the market already (save for a 1.8in model), and the new RevoDrive was announced below, OCZ displayed prototypes of what they dubbed the HSDL Interface: A High-Speed Data Link intended for huge data transfer. It's got theoretical read speeds with solid state media of 930MB/s and writes of 790MB/s, with 75000 IOPS using 4K random writes. In other words: very, very fast. OCZ hope to get HSDL out there in the near future.

We wandered down the hall from OCZ's room to the lift, heading to another room which XFX had adorned with camo netting, plastic guns and grenades, and booth babes. There were actually more booth babes in the XFX room than there were employees! In a strange turnaround for the previously NVIDIA-exclusive company (**www.atomicmpc.com.au/?131315**), only ATI products were displayed in the room. Though we had hoped to get a comment on this, word from the industry points at NVIDIA's refusal to supply Fermi cores – so we played with the 5970 Eyefinity 6 Black Edition card instead. It's got six mini DisplayPort outputs and two

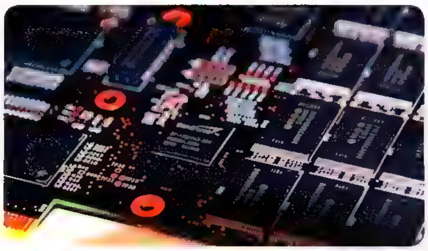


OCZ announces affordable solid-state PCIe storage

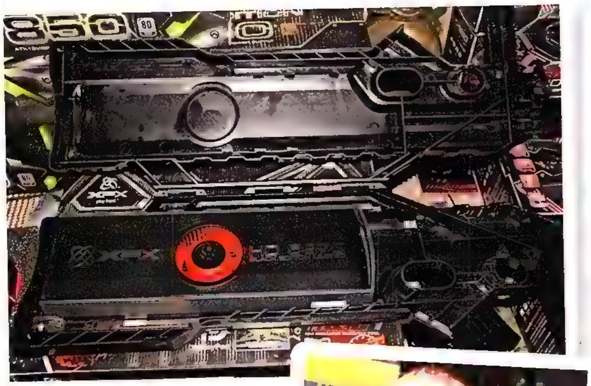
OCZ have been one of the top SSD manufacturers for quite some time, grabbing the highest ranking in our recent Atomicans' Choice Awards by a large margin, though their PCIe-based M84 drive (**www.atomicmpc.com.au/?172587**) failed to really impress. Not one to rest on their laurels, OCZ have taken it back to the drawing board to create a drive aimed squarely at the consumer: the RevoDrive.



The RevoDrive is based around two Sandforce SF-1222 controllers, the fastest current solution, matching these with eight flash chips from Intel to create what is essentially two full SSDs in RAID, though mounted to a single PCB and communicating through a PCIe 4x link. This also means that TRIM support is lost. Through thrifty design choices it seems that OCZ have kept costs managed to within 20% of the cost of a single Vertex 2, which places the retail price at a very rough guesstimate of $720.



Performance isn't quite going to be what an enterprise-level drive could generate, but it'll still be much higher than what the SATA 2.0 bus can give, and the RevoDrive will also be bootable to allow easy OS installation. It's shaping up to be the storage device to buy... until SATA 3.0 SSDs come out.



full-fledged 5870 cores, placing the card in direct competition with the ASUS Ares.

So many LEDs

While LEDs were a big focus of the consumer side of Computex, and many LED-powered lamps and bulbs were launched, none were as attention-grabbing as MSI's new Draken series of gaming rigs. They had on display a very colourful and highly modded version of one of the rigs, built around a Thermaltake Element S chassis with a multitude of new features built in. Of particular note are two voltmeters that give real-time readings of the two PSU rails, a PSU thermometer, an Aerocool fan control panel, three toggle switches for the internal lighting and an etched acrylic panel with the MSI logo on it. We're just disappointed we couldn't see this rig in the dark!

Also making a splash at the MSI stand was Futuremark's newest benchmark: 3DMark 11. A live demo of a very beta build was running, but it still showed off all of DirectX 11's features admirably – everything from Tessellation, Depth of Field and Volumetric Lighting was displayed. MSI have an exclusive branding deal with Futuremark for the benchmark, and in return for a MSI logo on the submarine in one of the tests, MSI are helping to fund the free version of the benchmark so that most enthusiasts can have a chance to try it out.

GIGABYTE show off CloudOC

HTML overclocking from the couch?

Overclocking is the ultimate dream and real-world hobby for the vast majority of Atomicans, for the sheer thrill of pushing technology further and faster than it was rated to go. While there is a measure of real performance gained, overclocking comes with a down side that until now has been unrealised – you have to be physically close to the motherboard to do it.

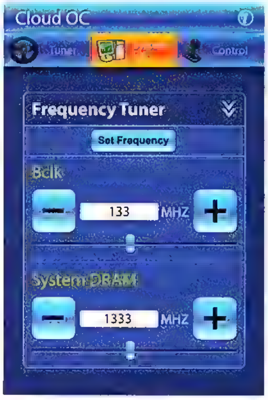
We've seen attempts at changing this crippling problem of proximity before from ASUS with both USB and Bluetooth overclocking, and those solutions are perfectly usable and functional for those who want to overclock from the same room. They took us a little further from our rigs, but CloudOC claims to take us to the ends of the internet itself. Using a HTTPS interface, CloudOC can tunnel through the tubes from computers, netbooks or mobile phones to give what we consider full control over the system settings for the very laziest (or busiest) overclockers.

We spoke with Rockson Chiang, Technical Marketing Manager, who explained that the "concept was first discussed during a Technology Creativity Meeting held once every month by the engineers and PMs", where eventually they "decided that CloudOC should allow any devices that can easily communicate with the PC."

All the settings that are needed to overclock a system are included through the interface, giving access to all processor, memory and system bus frequencies and voltages. With such control comes an inherent security problem – especially when communicating over the internet – but Rockson confidently explains that it's quite secure. "Currently CloudOC requires a user password to login. In addition, if the user is using a wireless environment, they can use the security from the router to prevent unauthorized users." We also confirmed that CloudOC can't work unless enabled in the BIOS – meaning your hardware shouldn't be hack-able (and crash-able) if you're at a LAN. It may even be possible to 'win' a celebrity overclocker's skills, getting their expertise applied to your rig from anywhere in the world!

Also announced at Computex was another function called HotKey OC, essentially a configurable set of macro profiles for keyboards that allow easy switching between settings. As introduced by Dino Strkljevic, GIGABYTE Technical Marketing Australia, HotKey OC is a feature that pro clockers have been running themselves for quite some time. "This little bit of software is all you really need for overclocking subzero. There is absolutely no need for an external box that some competitors use."

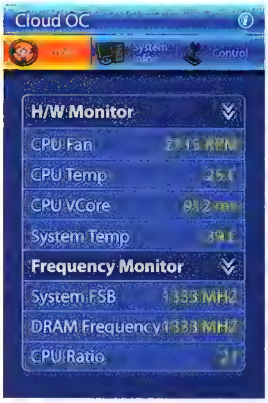
In addition to CPU clocks, GPU clocks can also be profiled to gain maximum stability in specific tests in a benchmark suite such as 3DMark Vantage, inflating the final score. Dino sums up HotKey aptly with "Atomic readers will basically have all the tricks in the book for 3D.....well...almost all."



Frequency Tuner

Bclk 133 MHZ

System DRAM 1333 MHZ



H/W Monitor

CPU Fan 2715 RPM

CPU Temp 25 C

CPU VCore 912 mv

System Temp 39 C

Frequency Monitor

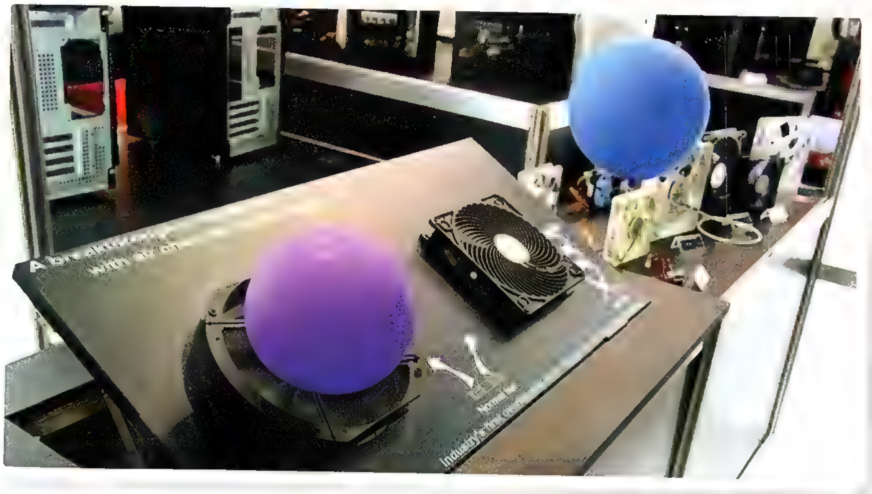
System FSB 1333 MHZ

DRAM Frequency 1333 MHZ

CPU Ratio 21

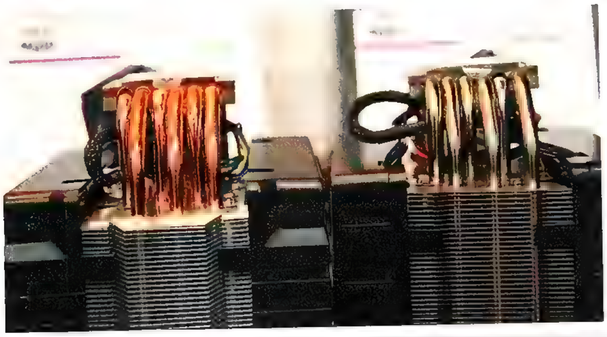
DAY THREE

We dragged ourselves groggily out of bed for the start of the third day, and Taipei's infamously wet weather had finally caught up with us. A night spent shooting pool with GIGABYTE and drinking beer with Coolermaster gave us that extra-special layer of tiredness that only Computex seems to bring, and the requisite three-odd hours of sleep plus litres of bad orange juice was all that kept us running. The city's traffic grinds to a halt during even light rain, but the wait at red lights wasn't too insufferable – they each have a count-down timer so you can gauge how long you'll have to wait. We headed straight to Nangang today, with quite a few stops on our list.



Feels cool, man

The first stand of the day was a quick stop in at Huntkey, prolific power supply producer and case manufacturer whose catch-call this year was 80+ Gold rated power supplies – ranging from the smallest 300W units all the way to 1000W. There were some rather funky prototype case designs on show, one in particular looking like the head of one of Sigourney Weaver's *Alien* enemies, and a neat little power board with LED display that measures power consumption on a per-port basis.

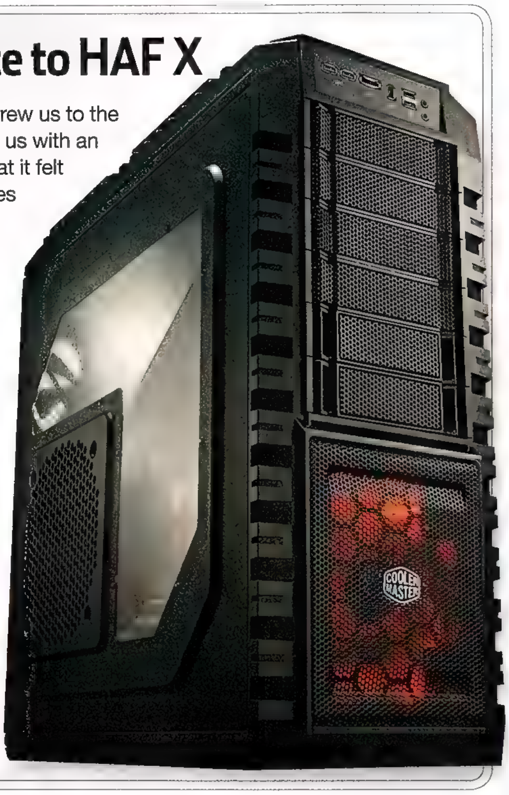


We then wandered over to Coolermaster's booth, peering at their new prototype ultra high-end case that has enough room inside to squeeze in five dual-slot graphics cards in ten expansion slots – not that any motherboard is big enough to support that... yet – that features more aluminium in its construction than a Boeing 747 wing. Also on display were two new entrants into the V series of heatsinks; specifically the V6 and the V6GT. While each have space for two fans and six heatpipes, the GT model adds a nickel coating and fills in both the available fan holes at a slightly higher premium. Rounding out the Coolermaster range was an update to the Elite series of budget cases. Perhaps not top of the wish list, but it's always nice to have a cheaper option. We also caught wind of a chassis coming in a very different colour to the ones we're used to seeing, but sadly that's all we can say about it at this stage.

CoolerMaster update to HAF X

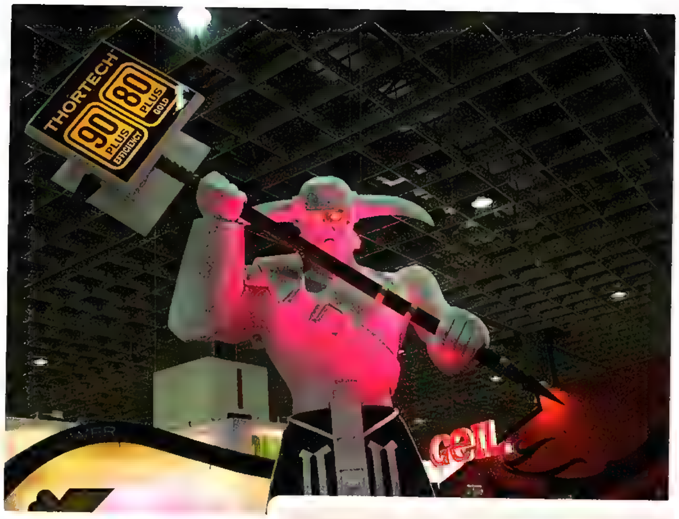
CoolerMaster grabbed us roughly and threw us to the ground, dropping their finishing move on us with an elbow to the chest – or at least that's what it felt like when we first looked at the HAF series of cases in late 2008 (**www.atomicmpc.com.au/?127136**). The HAF has been seriously tweaked since our first treatise of love, bringing in a bold new design that at first glance makes us feel like falling head over heels all over again. It's even got USB3 ports!

We'll reserve our final opinions for when we can get one of these babies into the Labs for some alone time, but it's one to look forward to in 2010.



From the ZOMG department

Heading to another case manufacturer, SilverStone, we found that they'd set up a little demonstration of the blowing power of their Air Penetrator fans (above). Supposedly the blades are formed from a single piece of plastic into a very specific shape that cuts a swathe of air and forms a balloon-embracing tunnel, while a standard fan has barely enough oomph to get one off the ground. It certainly seems like this is a large focus of where we can see SilverStone moving this year, and the Air Penetrator has thrust itself firmly into most of their new cases.



All heil GeiL

Memory manufacturers seem to be having a tough time making money from flash chips alone, a curious effect shown first by Corsair and OCZ, and again highlighted at this year's show – underneath the vast, crushing weight of SSD launches ran a strong undercurrent of power supplies. GeiL isn't immune to the lure of the little box of electrons, and threw their hat into the ring alongside a gigantic statue of Thor. Glowing and glowering menacingly down at all the show-goers (and inadvertently pictured in his transitional pink, rather than his normal red or blue) the statue's base was adorned with power supplies all labelled with the THORTECH brand and logo; a hand clutching a lightning bolt. Confusion over exactly where Thor's lightning was supposed to come from in ancient mythology aside (his hammer, actually), the highest-end 1200W units will come with a LED panel for 5.25in bays that shows off all the rails and even the efficiency, on top of adding in a fan speed control function. It seems power supplies might become interactive!

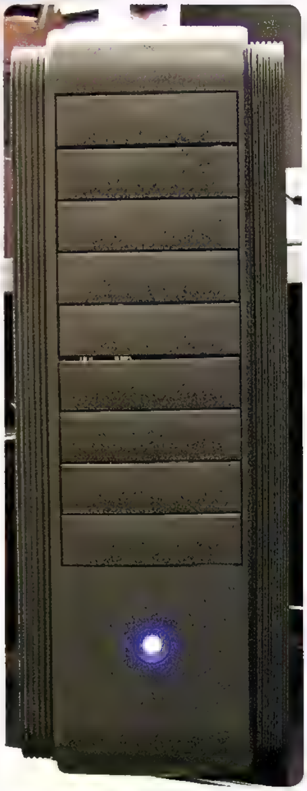
Your biggest fan

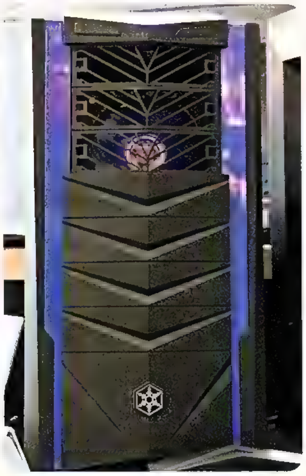
Arctic Cooling's booth caught our eye this year, sporting a new range of Hobby cars and other little toys that we couldn't walk past without having a play. While they're not confirmed for local distribution yet they certainly were a nice break from the speed of the show. And even better was a gigantic fan with a rough diameter of two metres, spinning smoothly against a wall. Sadly it didn't actually move that much air, but it looked really neat. Arctic Cooling have a bunch of heatsinks coming for the toastiest graphics cards out there, including a new model that gives ridiculous cooling for the 5970, but we didn't see anything on show for the infamous GTX480 card – perhaps given enough time (and copper) we can see something we'd be happy to use!

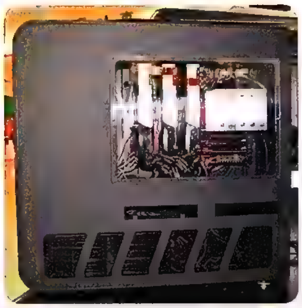
SilverStone's new-age cases

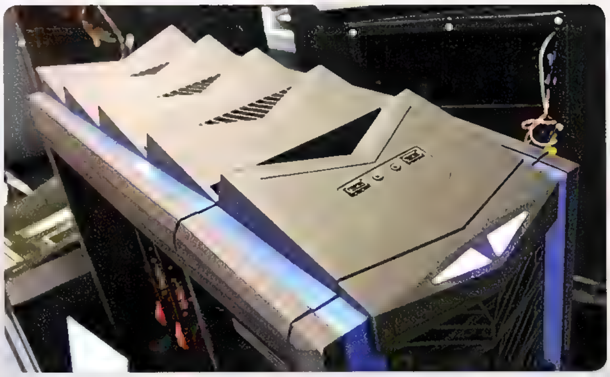
SilverStone have long been favourites for system builders thanks to some impressive designs, but they've been hard at work to improve these for 2010. First up is the Raven RV03, moving all its storage behind the mobo panel and absorbing the PSU deep within its shell. The superlative Temjin series of cases also receives an update, bringing the TJ11 that has support for radiators up to 480mm.

We've taken a bigger look online at **www.atomicmpc.com.au/?214831**, but these are certainly cases to keep an eye on.



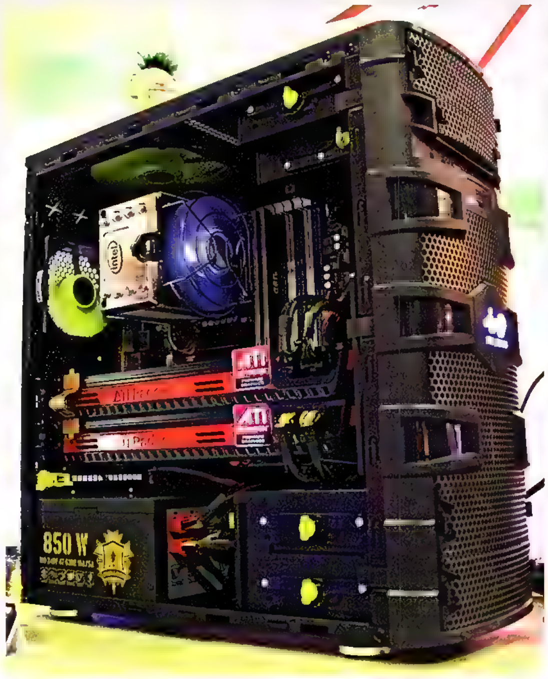






InWin make cases, but find time to slay dragons

A case that had us flabber-gobbed and gast-smacked.



Ahem. Sorry about that mishmash of words, but we really do have a good excuse for it – InWin's new Dragon Slayer case. There are very few things in the tech world that reduce us to babbling nonsensical gibberish, but when they occur, you can't stem our flow.

The Dragon Slayer is such a thing, and every part of its design seems to offer everything we could really want in a smaller case. Crafted for Micro ATX motherboards, it's got room for three 5.25in bays and three 3.5in bays – plenty on both storage and fan controller fronts. The front I/O panel boasts two standard USB 2.0 ports with mic and audio jacks, but bumps things up a notch with a USB 3.0 port and a very firm power button.

Internally the specs are just as enticing: a 140mm and 80mm fan that work in tandem to perform intake at the front, while 92mm and 140mm fans exhaust at the rear and top of the case. There's room for the biggest graphics cards in all of creation, and the maximum length tops out at 32cm, or 12.6 inches.

The build quality was superlative, feeling rock-solid even when wobbled from side-to-side with a full system contained within, and the thick pads it rests on prevent it from slipping when placed on a flat surface. Visually the Dragon Slayer strikes a perfect balance between garish and understated – at least to our tastes. Every part of the case is filtered where air comes in save for the panel behind the mobo tray, and even the top 140mm fan has one! It certainly seems like most complaints are absent.

Combined with the tooless vibration dampened HDD mount, support for a full-size ATX power supply and a price that is tentatively pegged at underneath $200, this is shaping up to be the best mATX case in terms of features we've ever seen. We'll reserve final judgement for a full review to see if mass production can retain this feel of quality, and to discover any hidden flaws, but the Dragon Slayer is definitely a shining example of one of InWin's best products at Computex this year.

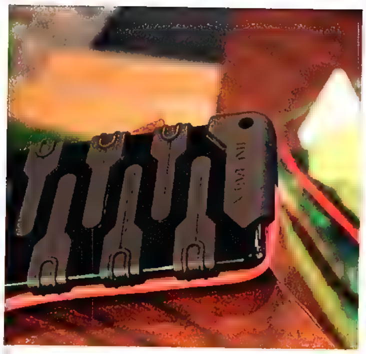
DAY FOUR

So begins the final day of Computex. We drag ourselves to a hearty hotel buffet breakfast of corn flakes, wedges with ketchup, warm smoked cheese and croissants. Clearly needing to replace all the matter in our digestive system with salt, carbohydrates and junk we fuelled up and headed back to Nangang for the remainder of our time in Taipei, whose weather had worsened and was now raining even harder. And sideways.

On a boat

InWin certainly had the most interesting stand of the whole show – themed like a boat, complete with its own internal grassy golf area and waterfall. Arranged on the bow of the boat were a multitude of glossy ITX cases (that could be stuck behind a standard monitor with VESA mount, seen over at *PC Authority* **www.pcauthority.com.au/?214714**). One of the more unique builds on show was the Silencer – that comes with a built-in anechoic chamber. Well, a chamber of sorts. Shaped like a gigantic wedge, the Silencer features a flat anechoic foam panel that is mounted perpendicular to the rear I/O ports of the case, supposedly devouring any system noise before it can bounce around the room. Sound-dampened panels and other features made it quite impressive, though we're still dubious on its actual silence considering the still-high amount of fans used.

Also on display was a case that came with twelve miniature horns stuck to the front of it, as well as two large ones. Functionally useless, aesthetically disturbing and questionably included, we were lost as to how this case had come about – and were thankful it was just a prototype that isn't likely to see the light of day. Though darkness will probably only make it



stronger....Ahem. Moving on.

Sustain this!

While passing the Patriot stand, we noticed a special rig had been created – then somewhat lost out the back of the stand. In it ran seven PCIe RAID cards with multiple SATA ports each, snaking underneath the system to power what is roughly quantifiable as a shitload of SSDs. *Iometer* was running on the system's display, showing a huge 153,489.47 sustained operations per second running through the rig. If random access by thousands of users is needed, RAIDed SSDs are inarguably the best solution. Not to mention how damn awesome they look.

Where will we go next?

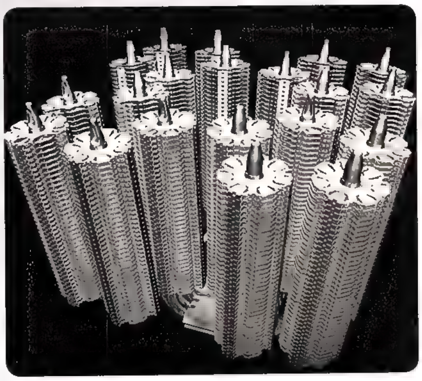
Another Computex has come and gone, and though this one has left us without a must-have list of tech purchases, it has given us a few things to consider. If you're upgrading or building any new system this year you'd be mad to do it without USB 3.0 support, and if you can throw it in a case that supports the standard then all the better. SATA 3.0 had invaded AMD's SB850 SouthBridge some time before the show, but Intel has yet to commit or admit anything about support for anything 3.0 – though we have seen prototype motherboards from ASUS for Intel's next processor, Sandy Bridge, which will launch into the LGA1155 socket late this year – whihc we're half-tempted to suggest you wait for.

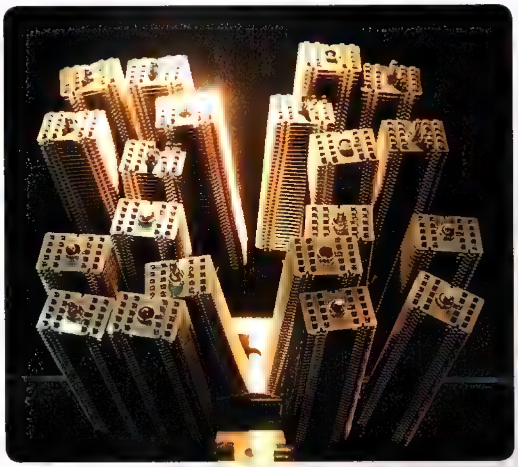
Rumours floated our way for a successor to ATI's 5xxx series of graphics cards late this year, and we'll certainly see some NVIDIA cards trickling down to the mainstream. For extra information about Computex that simply won't fit in these pages, head to **http://tinyurl.com/Computex2010**. To get our continued opinions on all the latest and greatest hardware, well, you know where to find us.

Thermalright Sentinel

Because everything is better with tentacles.

Atomic have always had an intimate relationship with Thermalright heatsinks, leading back to the early days of the magazine when we paired the SLK-800 with a Delta fan and tested it under a 80W heat load and thought it was fantastic. 80W these days is closer to a low-power processor than a snake's bellybutton is to the ground, and it's not uncommon for a six-core Gulftown chip to boost its 130W stock TDP by stupid amounts when overclocked – pushing it far above the capacity of standard air cooling and into the realm of the ridiculous.





But is it so ridiculous? Thermalright seem to argue no, and they're working hard on finishing up their latest 'sink that's half functional, half modern art. Dubbed the Sentinel for its similarity to those creepy robots of the same name in the Matrix movies, it features ten heatpipes that had to be squished flat to be crammed into the nickel-plated base. Each heatpipe bends over double and gives an effective twenty paths for heat to travel; multiplying out into twenty pillars of fins to create a literal forest of heat dissipation.

The whole heatsink is crammed into a square measuring 182x182mm, rising 165mm up from the base and weighing in at a seriously huge 1.2kg. Thermalright reckon the Sentinel's best home is in a case with a large sidepanel fan, but we can see this monster cooling our testbeds – hopefully in the very near future.

fractal design

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2. ModuVent™ Design for customisable cooling
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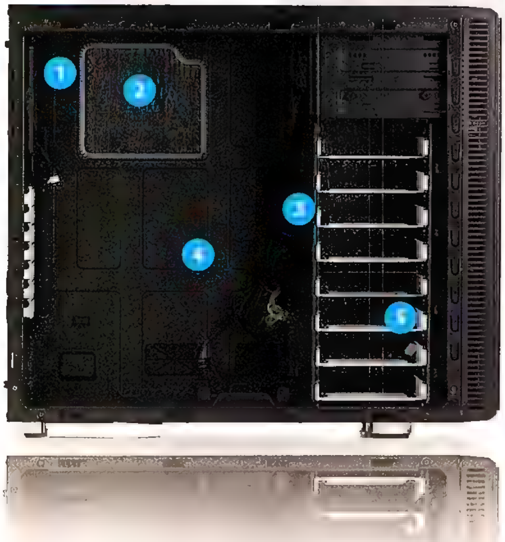
4. Built-in smart cable management
5. A total of 7 case fan slots for airflow and cooli



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HARDWARE

NEWS, REVIEWS AND ROUNDUPS ON THE LATEST HARDWARE

Just when you think there's no way we can cram any more tech onto these pages, we somehow manage to find a way, and you end up having to apologise to Justin for doubting his tech-testing prowess.

This month's head to head pits ATI against Nvidia and both against themselves in a DirectX 11 showdown like never seen before, and we answer the question: is the world ready for six-screen gaming?

There's also a PC case with a bit of a beak, a sound card that will make your ears feel all tingly with happy, a baby motherboard that brings the goods and and Intel's latest processor, plus lots lots more– so stop reading this slightly pointless intro and start reading the good stuff already!

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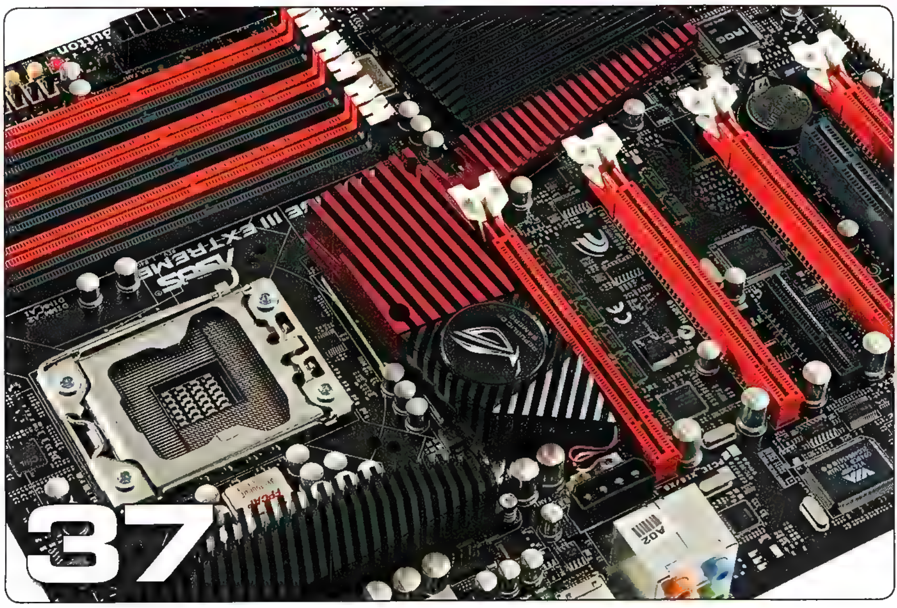
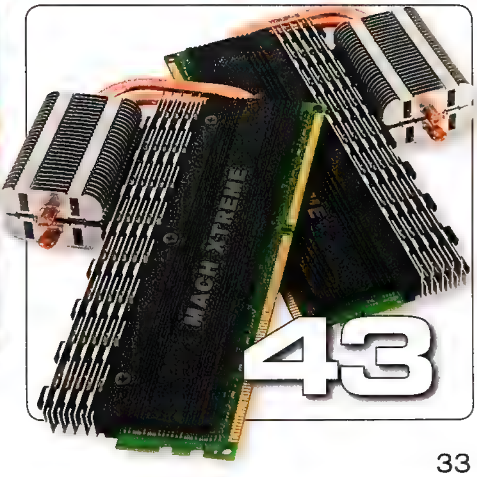




HOW WE **TEST**

We do a lot of testing in our labs, and we look long and hard at every piece of hardware to determine whether or not it passes muster. From taking a new card out of its packaging, to bundled extras, to performance, every facet of a given piece of kit's 'user experience' is under scrutiny.

In some instances, we have tough benchmarks to help us rate gear. For a CPU or a graphics card, raw performance is of course the most vital stat as whether it stinks or smells like roses, as well as the ability to overclock well. But there are other things we pay attention to in the review process.

Value for money is an important consideration, especially during the current financial climate. High end gear is expensive enough as it is, so we also look for good bundles. For instance, a graphics card that comes with a game or two, all the cabling you'll need, and little surprises like tools and other bumpf will score higher than a card that costs similar, but doesn't give you any presents.

Build quality is another thing we rate. From a PC case to a motherboard, we like our hardware well-made and capable of a taking a bit of punishment. We also like any included manuals to be clear and concise.

A lot of what we look for can be hard to put into numbers, we admit, but we try to think about what any enthusiast would think about their new gear after laying down money for it, installing it, and then using it.

And our benchmarks help, too. We've picked a suite of games and applications that anyone can get access too, so that you – the reader – can easily compare your own gear with the kit we have in each issue. In fact, we'd recommend to all our readers that they run all of these tests on their systems and save the results, so you can always have a familiar benchmark of your own to compare to the latest gear in Atomic each issue.

UNIGINE HEAVEN 2.1

Our test LAN: NRG systems with Phenom 9850 CPU, 4GB of DDR2 RAM and a 4870X2 graphics card. The mainstay of our games testing and events.

CPU Benchmarks:

Hexus Pifast

http://pifast.hexus.net/pifast.php

PiFast is a program that essentially calculates pi to a set amount of decimal places. It is a single-threaded application (one core/thread) and we run it at ten million places (10, 000, 000) using the Chudnovsky method, in the standard mode with no compression, and a FFT length of 1024kb. The program is free, so feel free to run it on your CPU and compare. Memory bandwidth plays a significant role in the final performance of this program, so be sure you bump up the frequency as well as the CPU clock!

wPrime

http://www.wprime.net/

“wPrime uses a recursive call of Newton's method for estimating functions”, says the website as it attempts to explain in plain English what it does. What it does is, essentially, complex square rooting and other number functions, which are able to be split up evenly between multiple cores, or simply run on a single core. We use wPrime 32M in both single and multi-threaded. The results of the single run are divided by the results of the multi run, and this gives us the efficiency of the CPU being tested – very useful knowledge to have when comparing chips and evaluating the benefits of overclocking.

Cinebench R10 x64

http://www.maxon.net/pages/download/cinebench_e.html

Cinebench is a stalwart benchmark, and is one of the more entertaining ones to watch. It focuses on rendering an image at 800 x 600 resolution, complete with ray-traced light effects and much more. This is able to be run in either singlethreaded or multithreaded mode, and efficiency is calculated exactly the same way as for wPrime. Simply download the .zip file, extract, and run! The program also supports up to 16 threads in total, and even eight threads with Nehalem is an impressive sight to see. The difference in performance between 32- and 64-bit is minimal – just keep that in mind if your results for the same setup are slightly different.

Everest Ultimate Edition

http://www.lavalys.com/

Everest is a system information tool that monitors voltage, temperature, as well as reporting on a massive list of other areas of your system. Hardware and software are noted here, but perhaps the most useful part of this program is the memory benchmarks. Ready for the fastest of dual/tri-channel memory, this tests the read and write bandwidth as well as latency. The program is a small download, but keep in mind that you only get a thirty day trial until you purchase the full version – something recommended if you're into getting the most info about what your tech is up to.

GPU Benchmarks:

Crysis

http://www.ea.com/crysis/

Crysis is one of those games that can scale from Average Joe's rig all the way to the beastly Dream PC in Kitlog; but due to recent graphics card releases we needed to bump it up a notch. Our testing now uses a standardised timedemo run, with all settings on high at a resolution of 2560 x 1600. While we can't run any antialiasing at this res and still get playable framerates on most cards, it's still more than enough to really give cards the workout they truly deserve.

Race Driver: GRID

http://www.racedrivergrid.com/

GRID, as some racing afficionados will know, is one of the most fun games of its genre to come about for quite some time, giving an accurate damage model along with realistic handling and a great visual style. Not only that but it is also very scalable over multiple GPUs, and is also capable of running on lower-end gear. We chuck all the settings to High, with 8x MSAA at 2560 x 1600 for this test, using FRAPS to monitor the frames per second as we tear around the track for a single lap in our car of choice – the Nissan 350Z.

Unigine Heaven 2.1

http://unigine.com/products/heaven/

A synthetic benchmark built specifically to harness the latest and most demanding features of DirectX 11, Heaven is one of the best ways to test a card's tessellation capabilities. With a built-in timed run around a fully realised world, this benchmark taxes cards significantly and puts them under serious stresses. We test at a resolution of 1920 x 1200 using 8x MSAA and 8x AF, completing two runs of the built-in benchmark. The first run is with tessellation set to ‘extreme'; the other ‘none'. This highlights how well the cards can handle DirectX11 features and what they'll be like in a game that doesn't use the effect.

3DMark Vantage (2008)

http://www.futuremark.com/3dmarkvantage/

As the first extremely convenient benchmark program around for DirectX 10, 3DMark Vantage is a new contender in the benching scene – and is proving very popular. While you can download and run it for free, this is only once, requiring a small fee to register your copy (though the bragging rights for showing off your rig may be worth it). Some graphics cards will even give you a copy! We run this at stock settings, which is the most appropriate for comparison between our results and yours. This is also significantly better at multi-gpu performance scaling efficiency.

Intel Core i7 875K

What happens when you inject a processor with botox?

Street Price $470 **Supplier** Intel
Website www.intel.com
Specifications 2.93GHz dual core; 45nm manufacturing process; 'Lynnfield' core; 32KB L1, 256KB L2, 8192KB L3; 22x unlocked multiplier; 95W TDP; LGA1156

Though we're not always ones to toot our own vuvuzelas, we were rather hyperbolic in our initial review of the i7 870 back in Issue 105 – but there is *always* something better just around the corner, and that corner has just been passed. Or has it? Intel's newest processor certainly appears to be very similar to the earlier model, and it seems the similarity isn't only skin deep.

The 875K sits in a fantastic place in the market and actually undercuts the preceding model by over $200. It misses out on the inclusion of a stock cooler, though proper enthusiasts wouldn't bother with such a wimpy hunk of metal and would (we hope) usually opt for aftermarket cooling no matter the build.

Specifications of the chip are identical to the 870 across most major points: the 875K has four 32KB L1 caches, four 256KB L2 caches, and a large shared 8MB cache that can be divided up by the cores on a situational basis – memory-hungry workloads can demand more, while lighter loads can use less. It retains the 95W power envelope and the 45nm manufacturing process, as well as the LGA1156 socket, and also sits at the same stock speed of 2.93GHz. In fact the 875K is so similar to the 870 that you'd almost certainly be hard-pressed to notice any difference!

Trusted execution technology

Intel has skimped on one feature of the 870, one that can roughly boil down to hardware antivirus protection – only allowing software to run in enclosed bubbles called 'measured launched environments' that keep nasties away from essential cogs in the operating system. As this was rarely used, it's a feature that won't particularly be missed, but it's nice to know where things were removed. Read more at: **www.intel.com/technology/security/**

A difference there must be, however, and in this case it is highlighted by the 'K' moniker attached to the name. This indicates that the processor multiplier is not locked as with most others. The locked multiplier is similar to a teacher keeping track of a class under exam conditions – and unlocking the multiplier produces the same result as removing the teacher in the same circumstance, allowing the students to cheat without restriction. By cheating we of course mean overclocking, and with the ability to change the base multiplier of the processor independently of the motherboard comes some new freedoms.

Traditionally, overclocking a processor involves raising the working frequency of the motherboard whose frequency is the value the multiplier relies upon to get the final processor speed, in this case 22x133, and therefore the stresses are placed on the system as a whole. Rather than raising the frequency, an unlocked multiplier can be raised independently without affecting other components to the same degree – and with this method we achieved a maximum stable overclock of 4.26GHz using a 32x multiplier and the same operating frequency of 133MHz, albeit at a higher core voltage of 1.424v. Impressively we even managed to get the system booting at 33x133, which equated to 4.39GHz and returned a wPrime score of 5.864 seconds – though this was not stable enough to run Cinebench.

Performance of the 875K at stock settings was identical to the 870, though our sample seemed more enthusiastic about raising its frequency with Turbo Boost to give a few extra points in benchmarks. Four processing cores can certainly chew through workloads quickly, and hyperthreading is put to good use to generate some decent efficiency changes when moving from single-threaded applications to multi-threaded ones.

Ultimately the 875K is a greatly affordable enthusiast processor that offers a lot of flexibility when overclocking, though probably isn't worth upgrading to if you've already got a Core i7 processor. **JR**

Intel Core i7 875K

i7 875K	133x22; DDR3-1600 8-8-8-24	150x22; DDR3-1500 8-8-8-24	175x22; DDR3-1400 8-8-8-24
PiFast	27.22s	24.37s	20.87s
wPrime 32M – single thread	40.998s	38.380s	31.699s
wPrime 32M – multi-thread	8.049s (5.20x efficiency)	7.192s (5.20x)	6.145s (5.21x)
CineBench R10 64-bit – single thread	4518	5027	5929
CineBench R10 64-bit – multi-thread	18683 (4.14x efficiency)	21219 (4.22x)	24057 (4.06x)
Everest Read	14680MB/s	15355MB/s	16062MB/s
Everest Write	10802MB/s	12178MB/s	14424MB/s
Everest Latency	47.4ns	45.7ns	43.8ns

Performance 94
Great bandwidth, nice performance.

Overclockability 94
Still grand, now unlocked.

Value 90
Not an unreasonable amount for a chip like this.

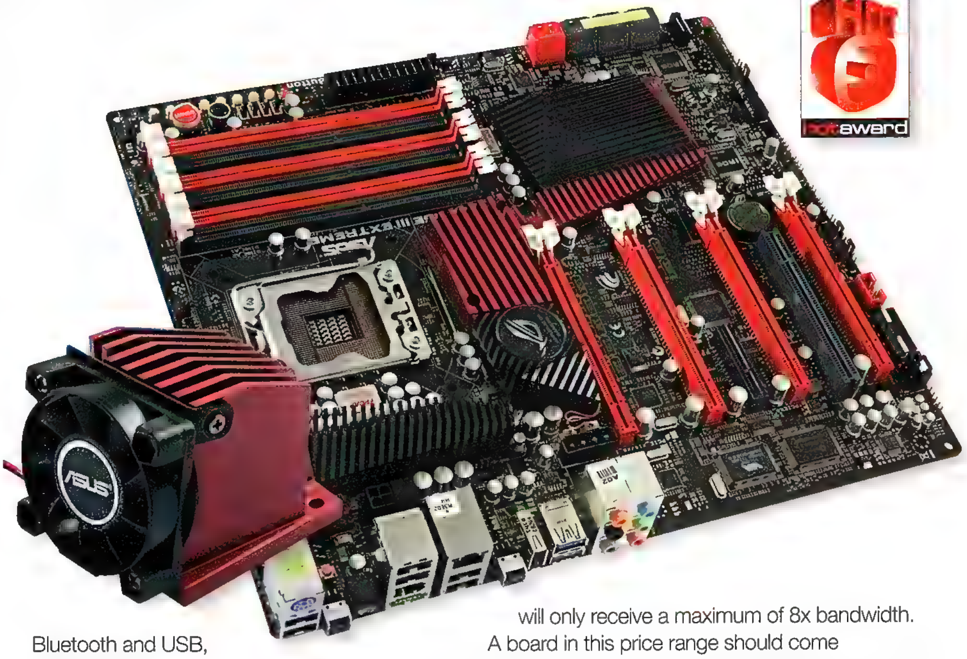
Overall
Still amongst the best processors; now even cheaper.

93%

ASUS Rampage III Extreme

Three times lucky and updated for 2010.

Street Price $545 **Supplier** ASUS
Website www.asus.com.au
Specifications Socket LGA1366; Intel X58 chipset; ATX form factor; 4x PCIe x16; 1x PCIe x4; 1x PCI; 7x SATA2, 2x SATA3; 2x USB3; DDR3-1800+
Gallery www.atomicmpc.com.au/?171876



The original ASUS Rampage board was built upon the Intel X48 chipset, a design that snuck in a few enthusiast features like hard power buttons, manual overclocking controls and elaborate chipset cooling. The Rampage II, as we saw in Issue 96, moved the design over to the X58 chipset; tweaking the layout to allow a cleaner and more functional board, though it retained the same features as the first as well as including a Clear CMOS button. Rampage III is here today, though there are certainly a few things that have changed.

Most noticeable are the now-standard additions of both USB3 and SATA3 ports, each enabled respectively through the inclusion of NEC and Marvell controllers that drive up the cost somewhat, but add storage flexibility. The aesthetic changes are clear as well, and ASUS has moved away from the mishmash of red, white and blue to a more coherent red and black. The cooling array for the chipset is where most of the changes have happened, bringing the board in line with the other products in the ASUS range. In its stock form the cooling array is decent at managing temperatures, though when overclocked it begins to strain under load and demands high airflow to remain comfortably cool.

Also new to the Rampage design is a series of hard voltage measurement points adjacent to the six DDR3 slots, alongside four hard on/off switches that enable each of the four full-length PCIe slots. While this is a feature that is of most use to LN2 overclockers who can't easily pull out graphics cards while waterproofed and at subzero temperatures, it doesn't do too much for the average user. ASUS has thrown in its ROG Connect overclocking options via Bluetooth and USB, and the board has an average-but-not-amazing Realtek ALC889 audio chip that uses a hybrid digital/analogue power delivery system for the LGA1366 socket.

For a board costing well over $500 its performance is certainly appealing – compared to the GIGABYTE X58A-UD7 from Issue 109, the Rampage III is faster in every benchmark save for memory bandwidth, though it makes up for that by having much shorter latencies. This continues through both overclocking steps, pipping GIGABYTE to the punch by an impressive amount in this already hotly contested high-end arena. Overclocking wasn't quite the experience we hoped for, however, and we only reached a maximum speed of 4125MHz at 165x25 – seven below what the UD7 can manage.

Another complaint that stems from the price is the lack of true Crossfire or SLI support above two cards; while the X58 chipset can power two cards at full 16x bandwidth, three or more cards will only receive a maximum of 8x bandwidth. A board in this price range should come equipped with an NVIDIA NF200 chip to multiply these lanes and give more breathing space – but the Rampage III relies instead on an awkward additional platform called the ROG Xpander to perform this task.

It connects with the first and third 16x PCIe slots, pulling their electrical connections directly into two NF200 chips and multiplying each original slot into two...resulting in full 16x bandwidth for each slot. This costs an immense $US100, and breaks the ATX spec so badly it'll never fit inside a case. For a board of this prestige to skimp on a feature and offer such a slapdash workaround is disappointing – its performance is still grand, but if you're after serious graphics workloads, the GIGABYTE X58A-UD9 will be the board to buy. **JR**

ASUS Rampage III Extreme

i975	133x25; DDR3-1600 8-8-8-24; 3.33GHz	150x25; DDR31500 8-8-8-24; 3.75GHz	160x25; DDR3-1604 8-8-8-24; 4.00GHz
PiFast	24.68s	21.87s	20.53s
wPrime 32M – single thread	37.83s	33.275s	31.201s
wPrime 32M – multi-thread	7.518s (5.04x efficiency)	6.707s (4.96x)	6.270s (4.98x)
CineBench R10 64-bit – single thread	5020	5722	6081
CineBench R10 64-bit – multi-thread	20553 (4.09x efficiency)	22935 (4.01x)	24672 (4.06x)
Everest Read	12500MB/s	11704MB/s	12519MB/s
Everest Write	12484MB/s	11710MB/s	12524MB/s
Everest Latency	40.5ns	41.9ns	39.9ns

Performance	Great stock performance, decent overclock.	92
Value	Very expensive, but comes with enough.	78
Features	Most marks checked, no Lucid or NF200.	94
Build	Mostly impressive, ROG Xpander is ridiculous.	85

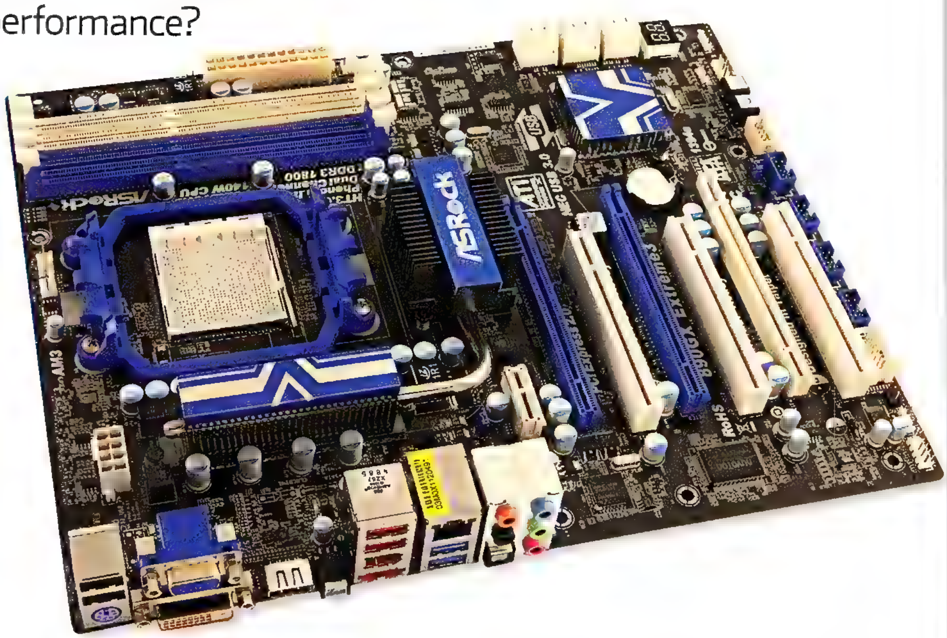
Overall
A very, very good board but with big bandwidth issues.

90%

ASRock 890GX Extreme3

Does half the copper halve performance?

Street Price $170 **Supplier** Altech
Website www.altech.com.au
Specifications Socket AM3; AMD 890GX chipset; ATX form factor; 3x PCIe x16 (16x, 8x and 4x electrically); 1x PCIe x1; 3x PCI; 6x SATA3, 2xUSB3; DDR3-1800+



You don't need a degree in psychoneuroimmunology to work out that the Extreme3 doesn't sit at the top of the premium tech market. A quick search online for a motherboard using the AMD 890GX chipset returns only one brand listed as cheaper than this one, and for a cost of only $170, the Extreme3 is cheaper than the lowest-end models from both ASUS and MSI – and the gap between it and GIGABYTE is even larger. Logic dictates that features have had to drop out to keep price down, but on its surface, the board feels surprisingly full-featured.

A black PCB meshes well with the dark blue and white colour scheme, though the first point of contention is noticed when we lifted the board proper – it's noticeably lighter than the competing brands. This is because it uses the traditional single-ounce copper design in the PCB layers; a cheaper solution that others have moved away from for both stability and an extra feature to list on the packaging. It also has a practical use for rigidity – the Extreme3 flexes a significant amount.

The power delivery to the AM3 socket is relatively average low-end fare, though it's either slightly overenthusiastic or unmotivated in alternate seconds. A core voltage of 1.5V resulted in 1.432V on the v1.10 BIOS, with significant vDroop that affected stability, and the same voltage artificially boosted itself to 1.552V when we flashed to v2.30. Thankfully for a budget board, the BIOS doesn't skimp on functionality, and is comparable to ASUS – even coming with a handy USB stick flashing tool – though strangely comes with an array of boot screen images that rotate each time the system is powered on.

USB3 ports come standard through the NEC chip onboard, followed by the surprising inclusion of VIA's nice VT2020 audio chip and a physical Clear CMOS button on the I/O panel. Hard power and reset buttons also make a showing alongside a LED POST screen, and though the latter doesn't display anything but POST errors, it's still welcomed. Six standard SATA3 ports are run off the SB850 chipset as normal, and the NorthBridge chip boasts a basic integrated graphics processor that can drive two screens at once with just enough grunt for HD video decoding.

Performance at stock settings was quite good compared to MSI's 890FXA-GD70 from last Issue using the same Phenom II X6 1090T, beating it across every test with an aggressive boost given from AMD's Turbo CORE tech. This showing mostly continued at the first OC step, though faltered upon the second step and tripped up on itself – being far too enthusiastic in boosting speed and crashing. It crashed so hard we had to remove the CMOS battery for a hard reset, but it came back functionally once this was done. Turbo CORE was disabled and we garnered some decent performance, though it was much lower than the MSI board.

We kept pushing the board as far as it would go, and ultimately reached the same maximum speed we generated with this chip in earlier testing – 4288MHz at 268x16 – though it only returned a CineBench multi score of 23546, 1183 points lower at the same speed. The board was also quite finicky and unstable, though remained cool even at these speeds.

For a budget 890GX board this is an interesting choice, though for long-term overclocking stability it may be worth spending more. **JR**

ASRock 890GX Extreme3

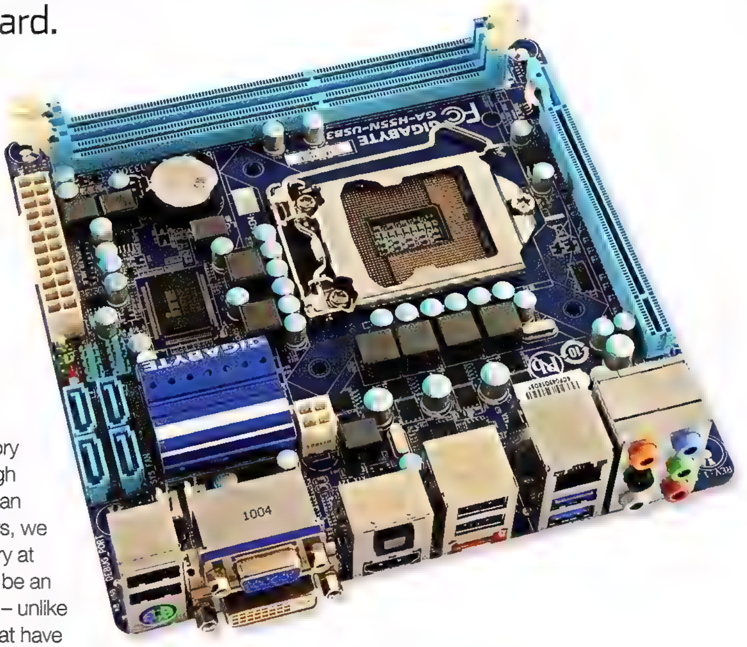
X6 1090T	200x16; DDR3-1333 7-7-7-21	217x16; DDR3-1446 7-7-7-21	230x16; DDR3-1532 7-7-7-21
PiFast	29.27s	28.27s	29.72s
wPrime 32M – single thread	37.83s	36.707s	39.063s
wPrime 32M – multi-thread	7.676s (4.93x efficiency)	7.380s (4.97x)	6.942s (5.63x)
CineBench R10 64-bit – single thread	4166	4375	4227
CineBench R10 64-bit – multi-thread	19852 (4.77x efficiency)	19669 (4.50x)	20824 (4.93x)
Everest Read	8792MB/s	9105MB/s	9563MB/s
Everest Write	7129MB/s	7371MB/s	8131MB/s
Everest Latency	48.6ns	46.4ns	44.9ns

Performance Nice at stock, though poor when overclocked.	85
Value A great price, has most things we'd want.	84
Features Standard semi-enthusiast fare.	80
Build Clean layout, cool, needs thicker PCB.	82
Overall A decent budget choice with a few middling flaws.	83%

GIGABYTE H55N-USB3

Aw, wook at da cute widdle muvvaboaaaard.

Street Price $165 **Supplier** GIGABYTE
Website www.gigabyte.com
Specifications Socket LGA1156; Intel H55 chipset; ITX form factor; 1x PCIe x16; 4x SATA2; 2x USB3; DDR3-1666



The ITX form factor has been around for a while, and though it first debuted almost nine years ago, we have yet to see it used in a seriously tempting enthusiast motherboard. ITX as a standard doesn't even conjure up ideas of high-powered computing; while there were P45 and older boards within the tiny 17cm x 17cm frame, there was a huge limitation on the processing power that could be harnessed. The H55N-USB3 also uses an ITX design, but doesn't really skimp on features... as much.

With support for all LGA1156 processors on the market today (including the 95W-devouring i7 875K on page 36), the chipset of choice here is Intel's H55 Express. This 45nm chipset sips very little power, and the small heatsink applied to it is more than enough to keep things stable even when under heavy loads. The H55 supplies all the inputs and outputs for the board: powering the four SATA2 ports, four USB2 ports with another four available through headers, and it interfaces with Intel's Clarkdale processors to offer up to two integrated displays. On top of these options come two USB3 ports added via the NEC chip onboard, a hybrid USB2/eSATA port and onboard audio through the Realtek ALC892 chipset. Not fantastic sound, but it'll be plenty functional – and digital outputs will be the best choice for quality here.

HTPC me!

You don't need to be an aeronautical engineer to buy an ITX case, a Clarkdale processor and a TV tuner, throw it all together to make yourself a tiny HTPC. You don't even need to be awake when you assemble it, though it arguably helps. High performance mini LAN rig? Yes please.

The form factor limitations begin to encroach on the board's features from this point onwards; there are only two DDR3 slots for memory up to 4GB, and though this is usually more than enough for most users, we found running memory at higher frequencies to be an exercise in frustration – unlike larger ATX designs that have multiple dedicated power phases for the memory slots, this board does not. A single 16x PCIe slot adds in the potential for higher-powered graphical performance, though lanes are shared with the USB3 ports and can diminish performance if both are used concurrently. Realistically this is not an altogether likely scenario.

Perhaps most noticeably reduced of all is the power delivery for the LGA1156 socket itself – it runs only four phases. While this is enough at stock speeds to power even Core i7 processors that can overclock themselves somewhat with Turbo, it's a huge limitation when overclocking manually. Power consumption can more than double when dealing with these high-end chips, restricting our normally speedy chip to a 3916MHz overclock (22x178 @ 1.35V, as seen here: **http://tinyurl.com/ATO-H55N**). Increasing voltage or frequency above these settings on Intel's quad-core chip drove power consumption far too high for the four phases, resulting in an abrupt shutdown of the board. That we can overclock at all on such a small board is rather impressive, however.

Another concern when attempting overclocking on such a small board is limited space; a Thermalright Ultra 120 Extreme won't fit with the memory and graphics card so close, so we resorted to a Thermaltake Contac 29 for cooling duties. Memory sticks can't be higher than the standard height or else they'll interfere with the cooler, and there are only two fan headers on the board.

At the end of the day this ITX board has plenty of flexibility and capability for most demands within the form factor, even our unusually taxing ones, and it's a great choice for any small-sized high-powered computing needs – even for the average Atomican. **JR**

GIGABYTE H55N-USB3

i7 870	133x22; DDR3-1600 8-8-8-24 (dual channel)	150x22; DDR3-1500 8-8-8-24 (dual channel)	175x22; DDR3-1400 8-8-8-24 (single channel)
PiFast	27.25s	24.23s	22.84s
wPrime 32M – single thread	41.041s	36.363s	34.556s
wPrime 32M – multi-thread	8.127s (5.05x efficiency)	7.176s (5.07x)	6.772s (5.10x)
CineBench R10 64-bit – single thread	4514	5087	5460
CineBench R10 64-bit – multi-thread	18723 (4.15x efficiency)	21018 (4.13x)	22224 (4.07x)
Everest Read	13957MB/s	15659MB/s	10927MB/s
Everest Write	10801MB/s	12204MB/s	10587MB/s
Everest Latency	49.0ns	43.8ns	42.0ns

Performance 85
Decent overclock, nice stock performance.

Value 85
Expensive for ATX; good for ITX.

Features 80
SATA3 and some other things missing.

Build 90
Impressively constructed, restrictive power phases.

Overall 87%
An ITX board that punches well above its weight.

ADVANCED ARMOURED WARFARE

As gameplay intensifies and the stakes get higher, any advantage makes a difference. This is why top-notch hardware requires a top-of-the-line chassis for maximum performance. HAF X fits the equation with unsurpassed airflow thanks to a meshed design, massive case cooling fans and a dedicated air duct for graphics cooling. It also features unmatched expandability with up to nine PCI-E slots, enough room for most XL-ATX boards and ability to install an internal radiator. With the inclusion of SATA docks and USB 3.0 compatibility, HAF X is in a class by itself.

www.coolermaster.com.au

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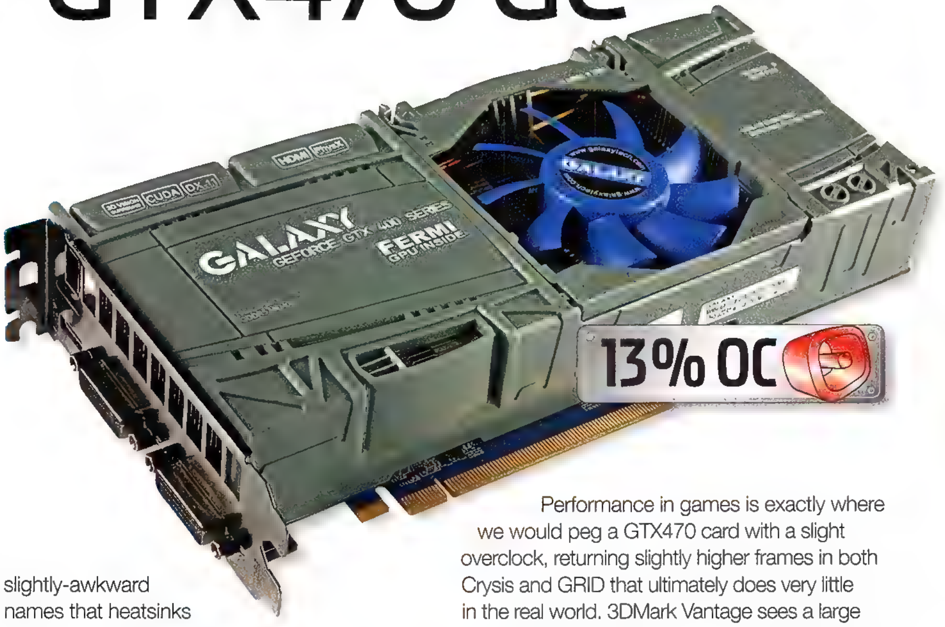
	YNOT Computer Systems	08 9330 7666	www.ycs.net.au
	Netplus Micro Computers	08 9242 7288	www.netplus.com.au

GALAXY GTX470 GC

Ain't that just fan-tastic.

Street Price $515 **Supplier** Galaxy
Website www.galaxytech.com
Specifications 625MHz core; 837MHz memory (3448MHz effective); 1250MHz shader; GF100 'Fermi' core; 448 CUDA Cores; 1.28GB GDDR5; 320-bit memory interface; dual slot PCB with active cooling; dual 6-pin power connector
Card info www.techpowerup.com/gpuz/588b2



Aftermarket cooling appears on its face to be a simple affair. Slap on a bigger lump of metal, attach a bigger fan and raise the price accordingly, and call it done. Reality differs somewhat from this idealistic view of what is a real problem – especially when dealing with one of the hottest GPU cores known to man. Galaxy aren't exactly new to the concept of a graphics card, and though the 'GC' edition of their card is slightly overclocked out of the box to 625MHz core (+18), the cooler used doesn't actually appear to be, well, cooler.

Gone is the reference PCB design of a standard GTX470, reworked to fit this new cooler that thankfully chooses to eschew the always slightly-awkward names that heatsinks are given. This new model consists of a large moulded plastic shroud, grey in colour with an array of labels printed on its surface such as "FERMI GPU INSIDE" and "Galaxy engineered detachable cooling system". The latter label is perhaps most interesting, as explained to the left, but the heatsink itself boasts four bare copper heatpipes with widely spaced aluminium fins. Performance isn't that much better than the reference design however; while load temps dropped comparably by six degrees to 82 at a slightly quieter (though still actually very loud) 65.7dBA, idle temperatures were only a degree better at 42 with 60.5dBA – generating an extra seven decibels for essentially the same job.

I'm a swinger, baby

The most novel function of the GC's heatsink, other than cooling marginally better, is that the fan can detach from the top edge of the plastic shroud and swing outwards through roughly 130 degrees of movement. This is supposedly to allow easy access for cleaning out dust which it does admirably, though the clips holding it in place are weaker than an atrophied pinky finger, and it's not a huge stretch to see the fan swinging open when the system is moved. Glows with blue LEDs though. Oooh, shiny.

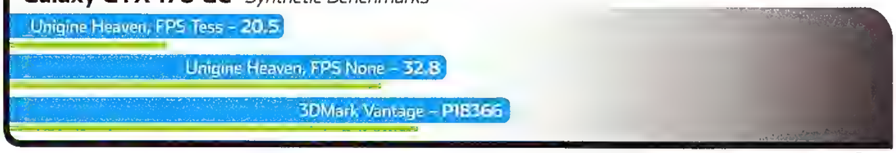
This is a little disheartening, as we had hoped to get an aftermarket solution with some decent performance benefits, though to its credit it survived running under MSI's Kombustor stress test for a significant period of time quite stably.

Performance in games is exactly where we would peg a GTX470 card with a slight overclock, returning slightly higher frames in both Crysis and GRID that ultimately does very little in the real world. 3DMark Vantage sees a large performance increase to the tune of 1581 points that can be attributed mostly to the new 257.21 driver, and is quite nice. In our updated Unigine Heaven tests (see page 34) we can see the card performing exceptionally well under extreme tessellation loads, and it does quite well without tessellation, too.

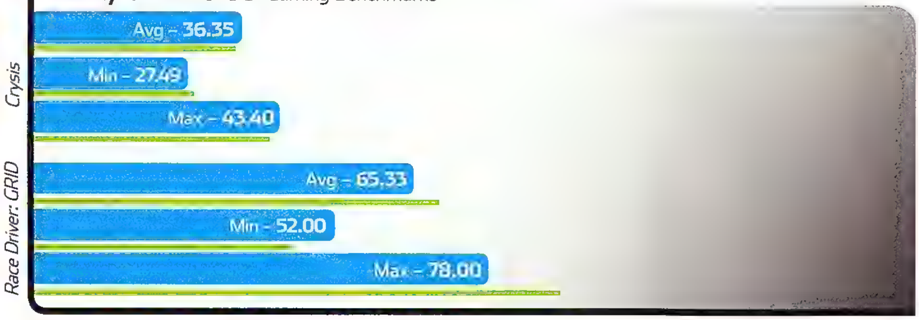
Overclocking went quite averagely, increasing a further thirteen per cent on the core to 705MHz (+80) though not increasing the memory speeds at all – quite a far cry from the Inno3D reference version last Issue that clocked to 782MHz on the stock cooler.

It doesn't come with anything particularly compelling in the box, and though there is a nice performance bump due to the factory overclock, the GC will run you a fifty dollar or more premium – which may be fine if you're after a unique card, but we'd suggest you simply grab a reference design and do it yourself. **JR**

Galaxy GTX470 GC *Synthetic Benchmarks*



Galaxy GTX470 GC *Gaming Benchmarks*



= Reference scores: XFX 5850

Performance Higher at stock, but doesn't clock far. 88

Bundle Nothing amazing. 65

Value Carries a premium, small stock OC. 75

Build Novel, but has similar drawbacks to reference. 82

Overall A decent card with funky features, but no must-haves. 80%

MSI GTX465

Oh NVIDIA, why.

Street Price $470 **Supplier** MSI
Website www.msi.com
Specifications 608MHz core; 802MHz memory (3208MHz effective); 1215MHz shader; GF100 'Fermi' core; 352 CUDA Cores; 1024MB GDDR5; 256-bit memory interface; dual slot PCB with active cooling; dual 6-pin power connector
Card info www.techpowerup.com/gpuz/e8x5z

Fermi. A core so fantastically complex that throughout its three billion transistors, even a handful of flaws can cause drastic problems. Called GF100 internally to NVIDIA, the GTX465 uses an identical core to the top-end GTX480 card – identical in both size (529mm^2) and transistor count – but in this case it comes with more than just a handful of problems. The original GF100 design calls for its processors to be marshalled into sixteen groups of 32 processors, called Streaming Multiprocessors; all GTX480 cards are flawed least with fifteen functional SMs; the GTX470 boasts fourteen; and finally, the GTX465 only manages eleven.

This means that of the potential 480 actual processors available in the current best card, the GTX480, only 352 of them are functional in the GTX465. Representing only 73% of what is an already reduced core, the GTX465 also runs at the same reduced clockspeeds as the GTX470, seriously hindering potential speed. Losing some of the core has also cost some of the memory bus, resulting in only a 256-bit wide connection compared to the top-end at 384-bits. One slight benefit of this crippled core is that the Thermal Design Power, or TDP, has been lowered to 200W and shouldn't demand as much juice as other cards – though it still consumes more power than a 5870.

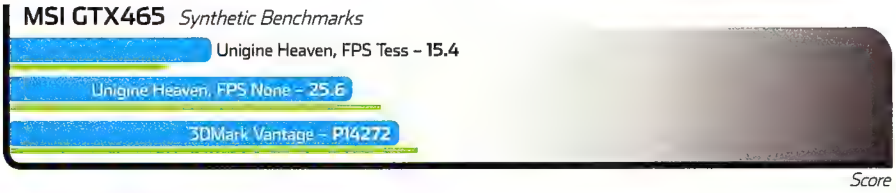
Physically the GTX465 uses the same reference cooler as the GTX470, wrapping up a complex heatsink design in a black plastic shell. The plastic is shaped to guide cool air through the heatsink within, transferring the heat from the card's core to the air and exhausting it out the rear of the system. Formed from five direct contact heatpipes, a chunk of copper and a bunch of fins, the heatsink is a serious player, and is enough to register a serious change in operating temperatures of the card. We recorded idle temps of 37 degrees and loads of 77, down from 43 and 88 on a GTX470, while it was slightly louder at 60.5dBA and 67.0dBA respectively. Potentially ignorable at idle, but as intrusive as a rhino in labour when grinding away for hours.

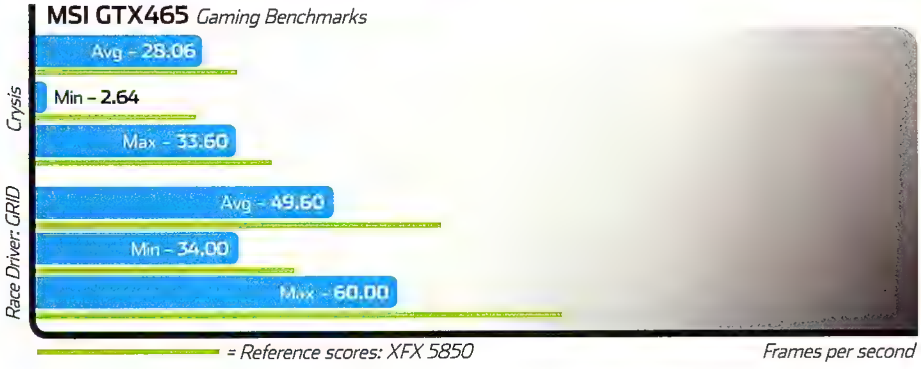
Electrically, the card still demands two 6-pin PCIe power connectors and a full-length PCIe 2.0 slot, offering two DVI and a mini-HDMI as output options. This particular model costs $470 as of writing, which is within spitting distance of the next step upwards. Unfortunately, the slight price drop doesn't match up in the performance stakes.

We saw underwhelming performance in Crysis, slightly choppy gameplay in GRID and a 3DMark Vantage score slower than our reference 5850 score by 484 points – and that's a benchmark heavily muddied by PhysX. Our new Heaven tests show the card is slower than the 5850 without tessellation, but if nothing else, the GTX465's dedicated tessellation units really come into play when it's been activated.

Interestingly the card had quite a lot of headroom when overclocking, which we assume is due to the heatsink. Our core clock increased by a whopping 28 per cent to 781MHz (+173) and the memory increased by 22 per cent to 978MHz (+176) for an effective quad-pumped GDDR5 speed of 3912MHz. Performance was almost that of a GTX470 at these speeds; seven extra average frames in Crysis to 35.54fps, and even 3DMark Vantage increased by 3727 points to P17999 at these clocks: a 26% performance increase for a 28% core clock increase.

So the GTX465 has the potential to be decent value, assuming the card you purchase will overclock as good as this one. Unfortunately this is not guaranteed in the slightest, and an ATI 5850 makes miles more sense – and is almost $90 cheaper to boot. **JR**





Performance 84
Great overclock, though not insanely fast.

Bundle 65
Nothing of note.

Value 70
Too much for the performance.

Build 86
Lame core made up for by nice cooler.

Overall 78%
Overclocking can't save this expensive card.

G.Skill Pi Series 2300 F3-18400CL8D-4GBPIS

We're sure it's memory to a hundred places.

Street Price $259 **Supplier** G.Skill
Website www.gskill.com
Specifications 2x 2GB kit; PC3-18400; DDR3-2300; 8-11-8-28; 1.65v; 240-pin DIMM; Non-ECC Unbuffered DDR3

G.Skill's Ripjaws memory has stuck around in the Labs for quite some time; it's proven to be quite flexible. This kit, however, slots into G.Skill's Pi series – and is much, much faster. Included with the two sticks is even a cooling fan; without which the sticks can become noticeably warm.

Default XMP profile settings are a very speedy 2300MHz with 8-11-8-28 timings, giving huge bandwidth scores that trounce even triple-channel kits (albeit at lower speeds). To achieve this the processor was overclocked automatically to 3.4GHz from stock, but the large latencies held back PiFast scores somewhat, and wPrime saw a similar story.

Overclocking was impressive but less so than the identically-priced kit below, hitting 2470MHz at looser timings and a tighter 7-9-7-24 at a lower frequency of 2000MHz – though both these settings didn't really do much in the real world. For a very fast memory kit this is nice value, but only serious users need apply. **JR**

G.Skill Pi Series 2300 F3-18400CL8D-4GBPIS

i7 875K	DDR3-2300, 8-11-8-28, 1.65V; 16x191=3438MHz	DDR3-2470, 9-12-9-28, 1.7V; 17x205=3485MHz	DDR3-2000, 7-9-7-24, 1.7V; 21x167=3507MHz
PiFast	25.01s	24.70s	24.79s
wPrime 32M – multi-thread	7.536s	7.72s	7.316s
Everest Read	20155MB/s	21041MB/s	18282MB/s
Everest Write	14912MB/s	15496MB/s	13235MB/s
Everest Latency	37.2ns	35.8ns	38.5ns

Overall
Fast memory, though pricy and hot.

82%

Mach Xtreme ArmorX MXD3AX23004GK

Interesting heatsink design.

Street Price $259 **Supplier** Mach Xtreme Technology
Website www.mx-technology.com
Specifications 2x 2GB kit; PC3-18400; DDR3-2300; 8-11-8-28; 1.65v; 240-pin DIMM; Non-ECC Unbuffered DDR3

MX are so new to the memory market that the dust has barely had time to settle, and nor does it appear to be doing so any time soon – MX has hit the ground running with a dual-channel memory kit running at 2300MHz with 8-11-8-28 timings. At these XMP profile settings we noticed slightly better wPrime scores and slightly lower PiFast scores as the G.Skill kit above, though they're very similar.

Overclocking was much improved due to the unique heatsinks on the two sticks (each mounted in an alternating fashion so they can be installed side-by-side), boosting the frequency up to 2520MHz at the maximum. We even lowered the timings somewhat and kept frequencies higher, though the best result is hard to call – 2520MHz seems fastest, but potentially due to the overclocked processor.

For $259 this kit is the fastest we've seen yet, shaming slower triple-channel kits, though you need to tweak them heavily to get them to their best. **JR**

Mach Xtreme ArmorX MXD3AX23004GK

i7 875K	DDR3-2300, 8-11-8-28, 1.65V; 16x191=3438MHz	DDR3-2520, 9-12-9-28, 1.7V; 17x205=3485MHz	DDR3-2152, 7-9-7-24, 1.7V; 18x171=3078MHz
PiFast	25.16s	24.32s	25.29s
wPrime 32M – multi-thread	7.456s	7.64s	7.504s
Everest Read	19577MB/s	21448MB/s	18740MB/s
Everest Write	14892MB/s	15744MB/s	13501MB/s
Everest Latency	37.9ns	35.1ns	38.0ns

Overall
Expensive, very fast, cool with minimal airflow.

90%

ThermalTake Black gaming mouse

The casemaker's making inroads into the eSports market, but can this mouse cut the mustard?

Street Price $68 **Supplier** Anyware
Website www.anyware.com.au
Specifications 3x mouse buttons; braided cable; 4000dpi laser sensor; 4x DPI settings; 5x 4.5gm weights; gold-plated USB connector

ThermalTake's making a serious effort to break into the serious gaming market. Seriously. The company, better known for its cases and cooling gear, has released a range of keyboards and mice themed to match its bold case designs – but does matt black plastic and red LEDs equal a superior gaming experience?

Well, the looks are certainly there. The Black mouse (really, can Thermaltake not come up with a better name?) features matt and gloss black styling, offset by red lighting on the Tt logo and mousewheel. A braided mouse cable will ensure a non-kink, low-wear future, but it is a touch short at 1.8m long.

The mouse is built around an asymmetrical design that's great for right handers, but lefties really don't get a look in. There's a moulded and grippy thumb rest to supposedly improve grip and control, but in our use we found our thumb didn't even reach it. Admittedly, we do have smaller than average hands, but given the mouse is actually shorter than our standard Razer test mouse, larger hands are going to find it a little cramped.

Curiously, given how ThermalTake's aimed this mouse at the eSports crowd, there are no customisation options. Up and down switches let you cycle through 400, 800, 2000 and 4000 dpi settings, but that's about it. It's a good range, but the option to fine tune them would be nice. There's also only three buttons in total – not a game breaker for us, but if you love customising your clicks, this may not be the mouse for you.

In actual gaming, the Black's a solid if uninspiring performer. It doesn't impact our completion time of Call of Duty 4's killhouse level, though it certainly feels very good under our hand. That said, there are some bumps in the mouse feet that caused a slight rocking motion in use – we doubt this will be present on every mouse, but it's worth noting.

This is a solid little mouse-performance, but given its limited features, it's also a touch pricey. The Sharkoon mouse from Issue 113 is nearly half the price and just as good, for instance. The Black does feature a more premium design, so if

Overall
A solid effort, though a touch overpriced.
79%

Coolermaster Silent Pro Gold 800W

Can this efficient unit manage to impress?

Street Price RRP$249 **Supplier** Coolermaster
Website www.coolermaster.com
Specifications ATX form factor; 24-pin, 8-pin ATX, 4x molex, 9x SATA, 1x Floppy, 3x 8-pin PCIe shared w/ 3x 6-pin PCIe; 80+ Gold

Coolermaster has bucketloads of experience with power supplies, and in terms of sheer volume and penetration of Atomican rigs, it's sitting in the number four spot as found in our recent Atomicans' Choice Awards. Coolermaster's Silent Pro M1000 unit, which we looked at recently, was a high-powered box able to supply a lot of juice, though it did so with unsteady voltages and wavering confidence – alongside only an 80Plus Bronze rating that highlighted its poor efficiency.

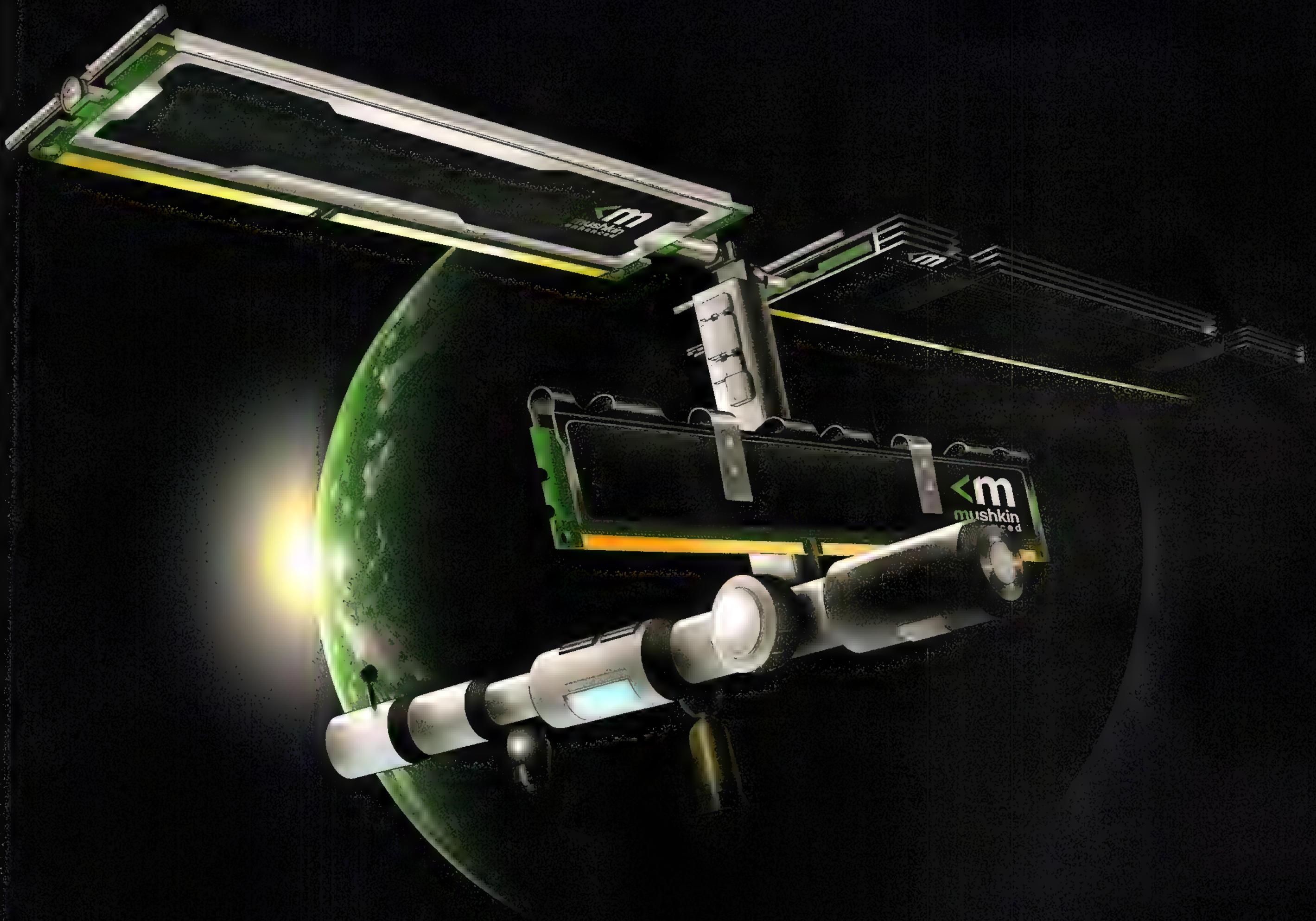
The Silent Pro Gold 800W, on the other hand, supplies an eponymous 800W of power while netting itself an 80Plus Gold – indicative of over 90 per cent efficiency when converting from AC 240V at the wall to DC 12V. It's a slightly elongated ATX form factor that combines a large 120mm exhaust fan with honeycomb ventilation to remove heat quickly, a process aided by a clever transformer design that embeds them inside heatsinks for better heat transfer.

While slightly low on Molex connectors there are plenty of other cables available to power even the most complex machines, and cabling neatness is helped by the modular design. Of slight concern, however, are the three PCIe connectors that each have a 6-pin and an 8-pin plug off the same wires; potentially drawing an awful lot of current.

Idle voltages on the 12v rail sat at a very nice 12.212v, while the 5v rail read as 5.035v. When loaded up on our testrig, consisting of a Core i7 965 (3.6GHz @ 1.375V) and two GTX470 cards in SLI running OCCT and MSI's Kombustor concurrently, the 12v rail dipped by a miniscule 0.003v and the 5v rose by 0.002v – in other words, hardly any change.

Noise was ignorable at full loading and the unit itself became warm to the touch, though this did not seem too unusual. For a large capacity unit boasting good efficiency and reliable rails, it's made all the sweeter by the included five year warranty. JR

Overall
A reliable unit with great efficiency, though it is a little pricy.
90%



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SteelSeries 9HD mouse pad

Yep. It's a flat inert piece of plastic, alright...

Street Price $50 **Supplier** SteelSeries
Website www.steelseries.com

We'd like to be able to say there is a fine and technical art to reviewing mouse pads – something that is at once scientific and irrefutable. Sadly... there isn't. Even more so than mice, using a mousepad is a rather individual thing.

The truth is it's more than possible to get similar performance from a suitably clean and smooth desktop surface – although they can be little more inconvenient to whack in the dishwasher if you want to clean them off. It's also a truth that most people have a desktop surface already – it comes free with every desk after all, and to some people shelling out money on a mousepad, especially one as expensive as SteelSeries' 9HD, is the height of insanity.

But if you want gaming performance at any cost, surely this is the way to go?

We're not sure.

There's no denying that the 9HD isn't a premium piece of kit – it feels good the minute you plop almost any mouse down on in. Movements feel slicker and more confident, and it's triple layer construction delivers both solidity (no cloth mat this one!), and non-slip sturdiness.

But it doesn't really add anything quantifiable to your gaming. Our progression through the killhouse in Call of Duty 4 was neither helped nor hindered by the 9HD. In fact, if we had to be pushed... there's a transient stuttering effect that sees your crosshair jump a few dozen pixels. It's not something we could reliably repeat, but it didn't happen on the plain desktop.

All that adds up to... well, more accurately, it doesn't add up to $50 worth of gaming value. Sorry, SteelSeries, but them's the facts. **DH**

Overall
Too much dosh for too little performance
70%

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in assosiation with intel

Creative X-Fi Titanium HD

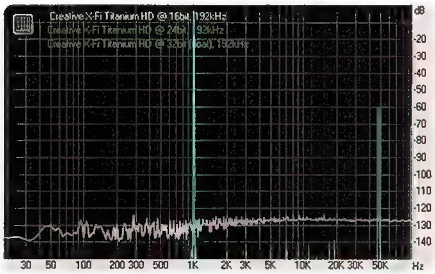
A surprising card that topples our previous best.

Street Price $279 **Supplier** Creative
Website www.creative.com.au
Specifications PCIe 1x; 3.5mm headphone, 3.5mm mic, RCA L/R line in/out, TOS-link optical in/out; replaceable Op-Amps

There is a fair bit riding on the capability of the Creative X-Fi Titanium HD. Audiophile respect is up for grabs.

On paper, the X-Fi Titanium HD has plenty of highlights, with a Total Harmonic Distortion (THD) rating of 0.001 per cent. The biggest problem with these figures is that they are numbers lacking context. The real tests come from listening and computational analysis. We rely on RightMark's Audio Analyser for this task. We used a selection of 24bit FLAC audio, from Sevendust's 'Cold Day Memory', Nine Inch Nails 'The Slip' and Peter Gabriel's 'Scratch My Back'.

We coupled some Tannoy Mercury F1 Customs to a Harmon Kardon HK 3490. Sevendust played first. Cymbals jumped off the sound stage and hit us in the face. Hard. We put it back to an integrated Realtek output for sake of comparison, and we found it hard to define them in the wash. Back to the Titanium HD, and it slammed home just how good the card is. We pushed through the NIN tracks and sure enough, we got that same wonderful "whoa, I didn't hear that last time" feeling that first put the Auzentech Prelude 7.1 so close to our hearts. Complex sound effects and unusual nuances of digital noise (unintentional in the recording or otherwise!) were all there in front of us. Plenty of bass colour, but it is balanced. Mid range is no longer sullied by the exaggerated highs and lows that are an affliction of many Creative cards. We popped in the Peter Gabriel release and were taken back by the definition of the strings, the tiny sibilances and plosives from his voice and the overwhelming sense of 'here in the room'.

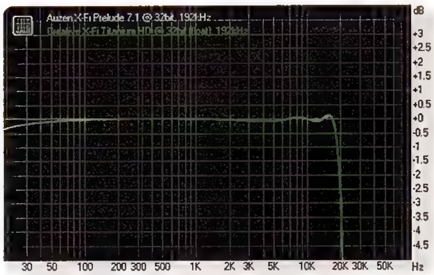


Dynamic range at 16, 24 and 32bit sampling resolutions.

We tested the card in 16bit, 24bit and 32bit sampling resolutions at 192kHz. We don't report at 44.1 kHz, as that isn't really what this card is intended for. At 16bit, the frequency response (from 40Hz to 15kHz) is close to the quoted specifications. Total Harmonic Distortion (THD) quoted on the front channel output at 0.001 per cent is bested by real world results of 0.0005 per cent. The mighty Auzen measured at 0.0011 per cent, back in 2008.

At 24bit, things became more pronounced with this card starting to really flex some muscles. An unbelievable dynamic range of 130.3 dB(A) and a THD that was immeasurably low. Unsurprisingly, this was replicated at 32bit, stat for stat.

Creative has finally done what it set out to do and knocked the king from the throne. Gripes? Connectivity options are minimal and purist. You won't find HDMI or other interfaces here. All copper, gold and optical. That being said, this will suit the budding audiophile just fine. As a final note – we've reached a point in SPU design and integration where market differentiation is very difficult. With vanishing THD and near impossible frequency response capabilities, it's really your amplification and speakers that will now hold you back. We'd swap some ultra high end Op-Amps into this card and let it fly. **JC**



Frequency response differential between the Auzen Prelude 7.1 and the Creative Titanium HD.

Creative X-Fi Titanium HD

	Auzen X-Fi Prelude 7.1 @ 32bit, 192kHz	Creative X-Fi Titanium HD @ 32bit (float), 192kHz
Frequency response (from 40 Hz to 15 kHz), dB:	+0.11, -0.10	+0.08, -0.09
Noise level, dB (A):	-96.4	-400
Dynamic range, dB (A):	96.5	130.3
THD, %:	0.0011	0
IMD + Noise, %:	0.252	0.0002
Stereo crosstalk, dB:	-84.7	-364

Sound Quality 95
Impeccable reproduction, spectacular sound.

Value 90
Surprisingly affordable for top-notch quality.

Features 85
Low on outputs, otherwise impressive.

Overall
The Titanium HD is a card that won't let you down – seriously.

90%

SilverStone PS05

A run-of-the-mill budget case... *yawns*

Street Price $68 **Supplier** Altech
Website www.altech.com.au
Specifications 190 x 466 x 485mm (W x H x D); 1 x 120mm fan (rear exhaust); 4 x 5.25in drive bay (external); 2 x 3.5in drive bay (external); 4 x 3.5in drive bay (internal); ATX, M-ATX; Steel construction; 6.2kg

If we drove down a busy street, leant out the window and bellowed "SilverStone!" at the nearest passer-by, odds are they wouldn't know what we were on about. Then they'd run. And probably wail in terror.

If we said the same thing to a computer enthusiast they'd almost immediately identify the company as a case manufacturer well-known for it's high quality and expensive cases – which makes the PS05 such a strange product, as it is neither of those things. In terms of price the PS05 commands a paltry $70, fitting amongst the cheaper members of its competition.

Visually the PS05 isn't breathtaking, consisting mainly of a steel construction predominantly featuring very thin gauge material. The fascia is constructed entirely from plastic, offering a decent amount of bays and a meshed bottom, though no active intake, merely a mount for one. There are plastic flares to the sides of the case that twist and look quite interesting, though the plastic seems to have a mottled patchy colour to it – as if it hadn't really set properly from the factory.

The top of the case features two USB ports and mic/audio jacks alongside power and reset buttons – two of the mushiest buttons that we've ever mushed. These feel as solid as watered-down jelly left in the sun on a hot summer day, and make an awfully distracting 'clunk' when pressed.

Both the sidepanels are bereft of any window, ventilation or interest, though each is coated in a smooth black paint. Unfortunately this paint picks up more fingerprints than a kleptomaniac at a garage sale, and quickly becomes quite coated. The panels are also quite thin and their fit with the main chassis is poor, though they are functional and secured with thumbscrews.

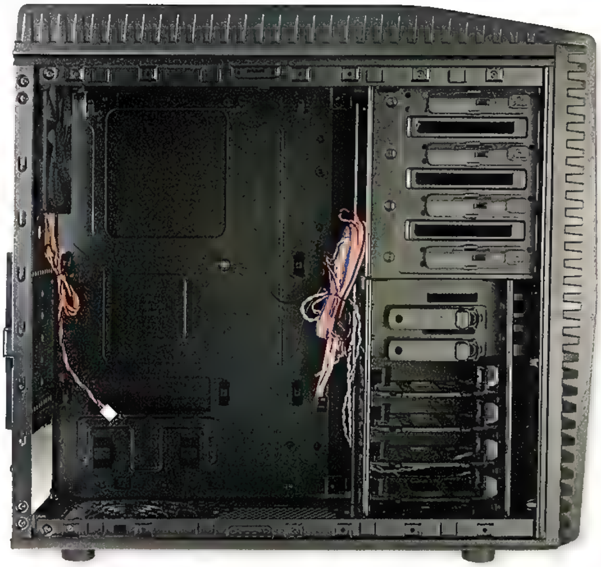
Behind the case it's a similar story – the black paint is impressively smooth but the metal is simply annoyingly thin. There are seven expansion slots with minimal ventilation and metal cutouts for watercooling tubes, but in a case such as this it's a far cry to expect any user to spend that much.

Internally the PS05 redeems much of its external failings, and its layout is very uncluttered. The PSU mounts at the bottom with appropriate filtration, with cutouts in the motherboard tray enough for small power cables – though not enough for either the 8- or 24-pin ATX cables. Hard drives mount on tooless rails, with other 3.5in drives mounting with clips into the two external bays. The clips feel rather cheap, though should do the job.

One of our biggest gripes with the PS05 stems from the cooling, with only a single 120mm exhaust fan included at the rear of the case. While there are other 120mm mounts at the front, bottom, and two at the top, none of these are filled. Thankfully they all seem to be filtered in preparation for fans, so should keep things clean.

The case also can't handle aftermarket heatsinks over a height of 160mm – meaning that the Thermalright Ultra 120 Extreme isn't going to fit. Other heatsinks of a similar height won't fit either. For a budget case this isn't completely unexpected, though it pays to keep it in mind.

Our biggest fear is that this transition to high-volume low-price cases will send SilverStone on a downwards spiral towards BudgetVille (population: 1,000,000 and counting). The PS05 doesn't fail to do anything essential in a budget case – but there is a lot that it simply can't do at this price range. **DH**



Build Not bad, though thin steel is used	70
Value A cheap box that'll hold your gear	85
Cooling One included fan, has potential for more	60
Features Nothing exceptional	65
Overall The wheel is not remade, but it's not exactly terrible	76%

NZXT Hades

G(r)eeky name, average case.

Street Price $135 **Supplier** Australia IT
Website www.australiait.com.au

Specifications 200 x 430 x 501mm (W x H x D); 1 x 200mm fan (front intake); 1 x 200mm fan (side intake); 1 x 140mm fan (top exhaust); 1 x 120mm fan (rear exhaust); 4 x 5.25in drive bay (external); 4 x 3.5in drive bay (internal, with adaptor); ATX, M-ATX; Steel construction; 6.95kg

Gallery link www.atomicmpc.com.au/?218202

Case design is one area of computing hardware that is unavoidably personal – the box you choose to shove your beloved gear into can say quite a lot about you. If you've chosen this case you'll not only be saying that you like gigantic noses, but also hinting that you might be a little unique. As we found however, that really means 'a little'.

The major design philosophy smacks you in the face as soon as you see it in the flesh, as the Hades boasts a gigantic protruding half-door that, rather than aiding function, merely impedes quick access to optical drives within. It's held closed with magnets that keep it relatively secure, but once opened the door swings back by itself on creaky plastic hinges; the added weight and resisting force of the LCD screen and its cables mounted inside give it an annoying tendency to refuse to remain open. The screen itself is a welcome addition, reporting three useful temperatures that are read by three internal temp diodes that can be sandwiched between heatsinks or taped to drives for real-time monitoring.

The only real link this case has to Hades is the red LED intake fans on the front and side panel, though each is a 200mm model that gives the case positive air pressure – the 120mm and 140mm exhausts on rear and top can't exhaust the same volume – meaning that dust and other particles shouldn't be sucked inside the case. For those larger goobies, like hair and Higgs Bosons, most intakes are meshed.

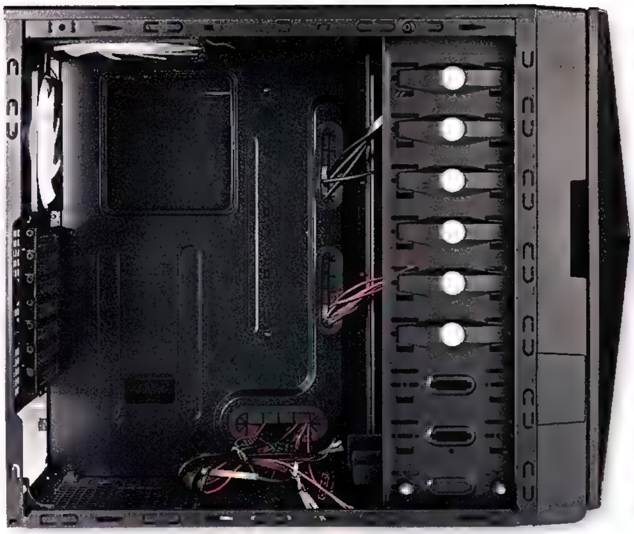
Other neat touches include two basic fan controllers for control over the 200mm fans and aesthetically pleasing side flares, pulling the panels out somewhat and making otherwise boring surfaces a bit more interesting. The paint quality appears very rushed, leaving a lumpy orange-peel finish on the surface of the case that doesn't lend it a high quality feeling.

Of particular note is the rear of the case, which has been constructed to be very open, giving airflow a chance to escape easily with large ventilation holes. Even the expansion slot covers are vented to aid with this, but these are unfortunately secured with screws – like cases of yesteryear. We don't demand too much on the tooless side of things, but thumbscrews would've been nice, at least.

Internally the Hades is surprisingly well thought out, boasting plenty of room for massive graphics cards and an open design that gets airflow travelling a very quick path past the warmer components. Cabling is pre-threaded for convenience behind the motherboard tray, itself featuring handy cutouts with rubber grommets to protect cables and hide them from sight, similar to Corsair's 800D. It's anodised a very attractive black which feels wasted without a window.

Infuriatingly in a case with such considered airflow the Hades doesn't leave a lot of room for aftermarket heatsinks – there's only 131.5mm of clearance with the 200mm sidepanel installed as per stock config, and 165mm without it. This effectively means you have to choose between high airflow and the best aftermarket air cooling, a choice that would drive many to a case that can hold all this gear.

Until this heatsink problem we didn't have much issue with the case beyond strange fascia designs, but considering there are other cases around this price point such as the Coolermaster CM690 II Advance (**www.atomicmpc.com.au/?173423**) that can manage just fine, the Hades seems poor in comparison. **JR**



Build 65
Dodgy door on a cramped case.

Value 75
Ok for a budget rig, but it's not hardcore.

Cooling 80
Would be great if it fit a real heatsink.

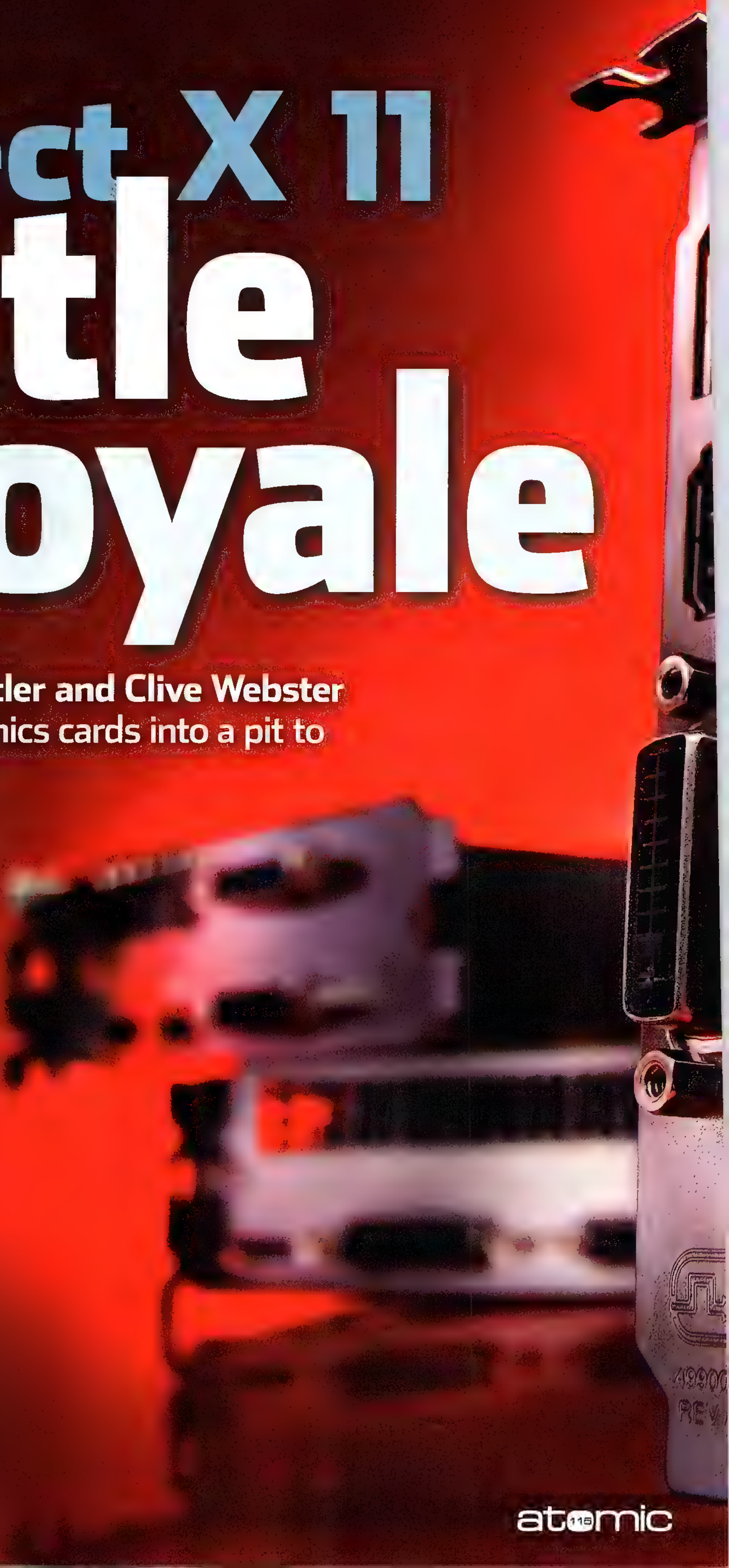
Features 80
Nice cabling, LCD.

Overall
A poor enthusiast choice, but otherwise functional.

72%

Direct X 11 Battle Royale

James Gorbold, Harry Butler and Clive Webster throw seven high-end graphics cards into a pit to see which claims top spot.



Unlike DirectX 10, which never really took off thanks to the slow adoption of Windows Vista and the small advantages it provided to gamers and developers, DirectX 11 has been far more successful. ATI currently produces seven different DirectX 11 GPUs, while developers have sprung into action and released lots of DirectX 11 games, such as *Battlefield: Bad Company 2* and *Dirt 2*. This month, roughly six months behind schedule, Nvidia has finally launched its first DirectX 11 hardware, although both cards are aimed at well-heeled gamers, not entry-level or mid-range gaming rigs.

With so much new hardware available and lots of DirectX 11 games to play, this month's Head2Head aims to answer the question of which graphics card you should upgrade to. You'll find separate reviews for each of today's highest-powered DirectX 11 gaming graphics cards.

Read on to find out which DirectX 11 graphics card should be at the heart of your gaming rig.

ATI RADEON PREMIUM GRAPHICS
Radeon HD 5850
HIS
AMD

How We Tested

For this Labs test, instead of testing individually branded graphics cards from manufacturers such as Sapphire and XFX, we decided to test generic examples of the designs on which these cards are based. As the GPU and its accompanying RAM have the greatest effect on the performance of the graphics card, this meant that we were able to test the current hardware that all DirectX 11 graphics cards use, thus giving you more information on which to base your purchasing decision.

While there are a few ways to test graphics cards, we've decided to focus on playing modern games and measuring the actual frame rates the card produces. By testing in this way, the frame rates that we record are representative of actual gameplay – what you could expect from that card from any manufacturer.

We tested the graphics cards by playing five different games at several different settings. Obviously, we don't expect a low-end card to be able to handle high resolutions with plenty of AA, so we judge each card based on the purpose for which it's designed. High-end cards are judged mainly on their ability to handle high resolutions, while mid-range cards are judged on how well they can run games at medium resolutions.

Still, we expect all modern cards to be able to handle the latest shader-heavy games at maximum detail settings. This means that if a game supports both DirectX 10 and DirectX 11 we test in DirectX 11 mode. We also test every game (apart from STALKER: Call of Pripyat) with 16x AF enabled, as this dramatically improves the image quality. After all, what's the point in buying a new graphics card if it doesn't allow you to turn up the settings and enjoy the game in the way that the developer intended?

The five games we test with are Battlefield: Bad Company 2, Dawn of War 2: Chaos Rising, Dirt 2, Crysis and STALKER: Call of Pripyat. These are a mix of DX11 and DX10 games, and as we play each one, we measure the minimum and average frame rates using FRAPS (**www.fraps.com**). By looking at these figures, which are listed in the graphs later in this Head2Head, you can see the resolutions and image-quality settings at which each graphics card can run the game smoothly. The definition of smoothly in this context is also important, as we consider both the minimum and the average frame rate. The reason for this is that, as the eye perceives the lowest frame rate, a low minimum means that you'll see the game stutter and jerk, even if the average frame rate is high. For this reason, we define a game as being playable only if the minimum frame rate is 25fps or higher.

To give an average representative high-end system, our test rig comprises a 3.2GHz Core i7-965 Extreme Edition CPU, accompanied by 6GB of Corsair TR3X6G1333C9 and an Asus P6T Deluxe V2 motherboard based on the Intel X58 chipset. This system runs 64-bit Windows 7 so that applications can take full advantage of all the system RAM. To ensure that even the most power-hungry cards were provided with a stable supply of voltage and current, the test rig is fitted with a 1kW Corsair HX1000W PSU. All the ATI cards were tested with the WHQL-approved driver, Catalyst 10.3. However the NVIDIA driver, ForceWare 197.17, was still in BETA stage and not WHQL-approved.

Battlefield: Bad Company 2

STALKER: Call of Pripyat

Dirt 2

ATI Radeon 5770

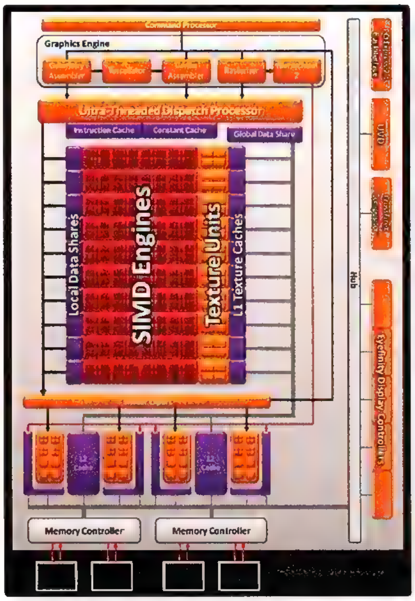
An affordable entry point to playing DirectX 11 games on your PC.

Street Price $180

While ATI has launched a full range of DirectX 11 GPUs catering for budgets as low as $115, the Radeon 5670 and 5750 just don't have enough grunt to be worth considering by anyone seriously interested in gaming. With this in mind, the Radeon 5770 is the cheapest DirectX 11 GPU that has a chance of keeping your frame rates and detail levels high.

The Juniper GPU at the heart of the 5770 is in effect a full-fat Cypress chip cut in half, sporting ten stream processor clusters compared with the Radeon 5850 at 18 and the Radeon 5870 at 20. These clusters (also known as cores) are clocked at 850MHz, the same frequency as the 5870 and, thanks to Cypress' modular nature, are identical to those found in the high-end GPUs. Each cluster is made up of 16 five-way shader processors, giving the 5770 a total of 800 (16 x 5 x 10) individual stream processors. Each cluster is served by four texture units, a 32KB local data store and 8KB of Level 1 texture cache.

The back end of the chip has also been heavily downsized from the high-end models, with two 64-bit memory controllers in place of the four found on both the 5850 and 5870, resulting in a 128-bit memory interface. Combined with 1GB of GDDR5 clocked at a 5870-matching 1200MHz (4800MHz effective), this gives the 5770 a theoretical 76.8GB/sec of memory bandwidth.



As the Juniper GPU is much smaller than those used in the high-end Cypress GPUs, the 5770 consumes less power, so it can get away with a shorter PCB and smaller cooler. While it's still a dual-slot card, the PCB's length of 219mm means that the 5770 will fit into even the tightest micro-ATX cases, and with just one 6-pin PCI-E power input it doesn't need a big PSU either. TDP is rated at a maximum of 108W.

The cooler is a scaled-down version of that found on the Radeon 5850, with a fan pushing air towards the rear of the card and out of your case, with the familiar black plastic shroud channelling air through the cooling fins fitted above the GPU.

While the 5770 is the lowest-priced GPU we tested, it still delivered playable frame rates in all three of the DirectX 11 games we tested. Dirt 2 in particular runs well, with the 5770 delivering a smooth minimum frame rate of 35fps at 1920 x 1200 with 4x AA. STALKER: Call of Pripyat also runs well on the 5770, with a playable minimum frame rate of 30fps at 1920 x 1200.

However, cracks start to appear when you look at the more demanding DirectX 10 games. In Dawn of War 2: Chaos Rising, running at ultra detail, the 5770 was unable to deliver a playable minimum frame rate at any of our test resolutions. While this is a very demanding test, simulating a heavy multiplayer battle, the 5850 delivered a playable minimum frame rate of 27fps at 1920 x 1200, almost twice the frame rate of the 5770.

Crysis remains the toughest game to run smoothly when set to very high detail and, not surprisingly, the 5770 didn't stand a chance of delivering smooth performance. Even at 1680 x 1050, the minimum frame rate of 13fps was far too jerky to be playable, and enabling anti-aliasing only makes the situation worse.

Battlefield: Bad Company 2 was a little easier to run, though, with the 5770 producing a playable minimum frame rate of 32fps at 1920 x 1200 without any AA.

The 5770 is also easy to live with when it comes to heat output, noise levels and power consumption. Our test system drew 224W from the wall under heavy load with the 5770 installed.

The 5770 runs slightly hotter than the single-CPU high-end Radeons, with an idle delta T of 22°C and a load delta T of 53°C, but this is fine when you take into account the unobtrusive noise of the cooling fan. Delta T is a measure of the heat differential between the ambient room temperature and the heatsink temperature.

Despite its place towards the bottom of ATI's DirectX 11 range, the 5770 still serves up decent frame rates, albeit at lower resolutions such as 1280 x 1024 or 1680 x 1050 in many games. However, it can't really handle more demanding DirectX 10 games such as Dawn of War 2 and Crysis without compromise.

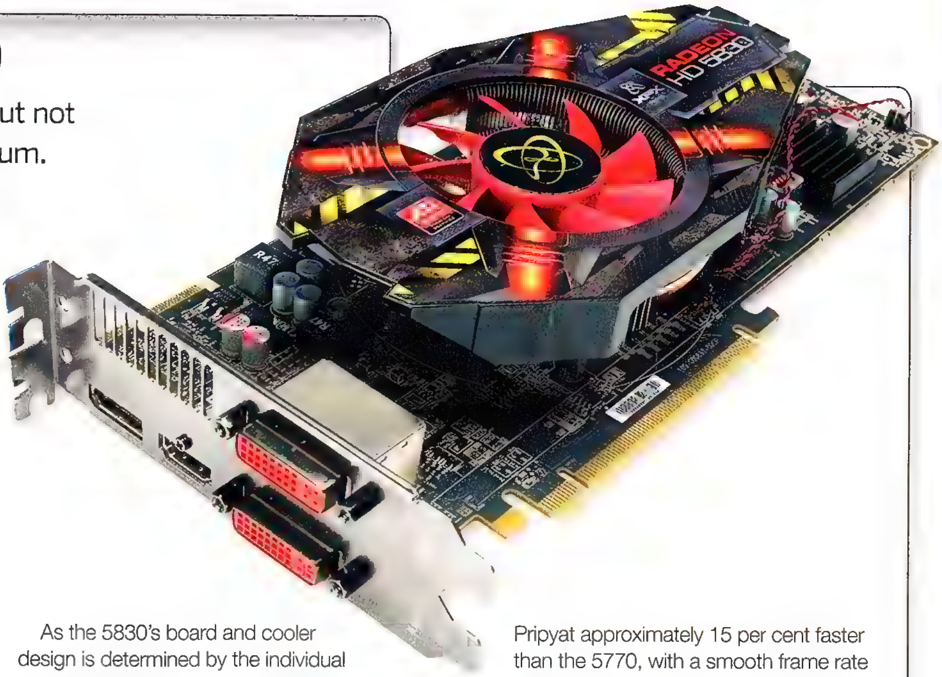
While the 5770 is cool and quiet in operation, as well as being easy on your electricity bill, it's really best suited to lower resolutions and settings in these games. Those looking to game at 1680 x 1050 or above will need to dig deeper into their pockets. **HB**

Pros	Cons
Good 'medium' performance	Poor 'high' performance
Short length for compatibility	Similar to last-gen 4870
Quiet, cheap and cool	

ATI Radeon 5830

A little more go than the 5770, but not enough to justify the price premium.

Street Price $285



The ATI Radeon 5830 is unique in this batch of GPUs in that ATI doesn't produce a reference card. Instead, board partners buy the GPUs and then build their own cards, leading to a huge variety of designs as each board partner uses a different cooler and power circuit.

The GPU at the heart of the 5830 is the same in every card, though, and is an odd mish-mash of the high-end 5870 and the mid-range 5770. During the production process, some chips won't quite make the grade to become a fully fledged 5870 or 5850, so ATI disables a number of the stream processor clusters, then labels them as 5830s.

While the 5830 is the same size as a top-end Cypress GPU, the number of stream processors has been cut from the 1600 in the 5870 to 1120, grouped into 14 stream processor clusters with a core clock speed of 800MHz. Despite the 30 per cent drop in stream processors, the 5830 retains the full complement of four 64-bit memory controllers, resulting in a 256-bit memory bus. When combined with 1GB of GDDR5 clocked at 1GHz (4GHz effective), this results in 128GB/sec of memory bandwidth – the same as the 5850.

However, while the 5830 might sound as though it's only been marginally scaled down from the 5850, it has a real shortage of ROPs, which have been halved from 32 to 16, the same as the 5770. This means that the 5830 lacks much of the post-processing power of its more capable siblings.

As the 5830's board and cooler design is determined by the individual board partners, each will take a different approach, although the general consensus is to use a reference 5850 PCB. This means that most 5830s on sale ship with full-length 240mm PCBs, although there are examples such as the XFX Radeon 5830 (pictured) that use specially commissioned shorter PCBs.

Frustratingly, there isn't even a set power standard for the 5830, with some partners shipping cards that require one 8-pin and one 6-pin PCI-E connector and others that need just two 6-pin PCI-E connectors. However, all 5830s are dual-slot cards due to the fairly hefty thermal output of the GPU, which has a TDP of 175W.

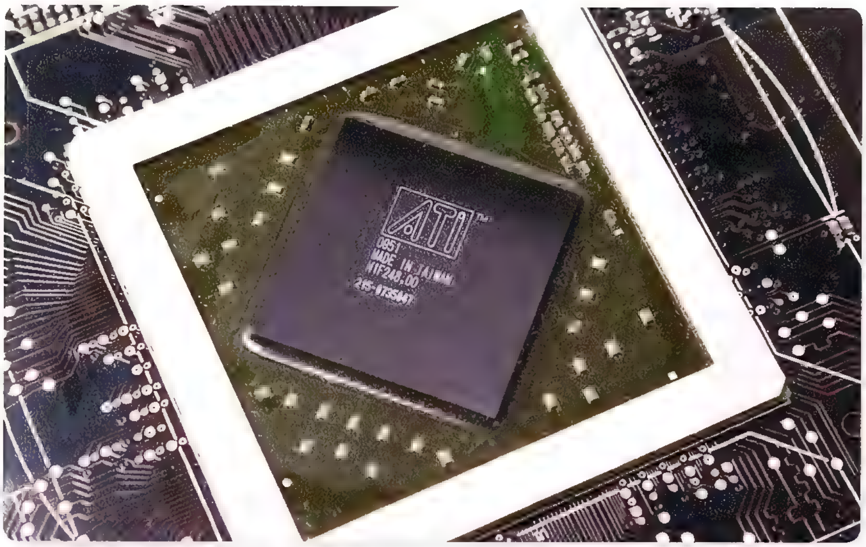
The 5830's performance falls midway between the cheaper 5770 and more expensive 5850. Dirt 2 in particular sees a fair improvement from the 5770, with the 5830 running between 9 and 18 per cent faster, and delivering playable frame rates right up to 2560 x 1600 with 4x AA.

Similarly, the 5830 ran STALKER: Call of Pripyat approximately 15 per cent faster than the 5770, with a smooth frame rate at 1920 x 1200, even with the game at its maximum detail settings.

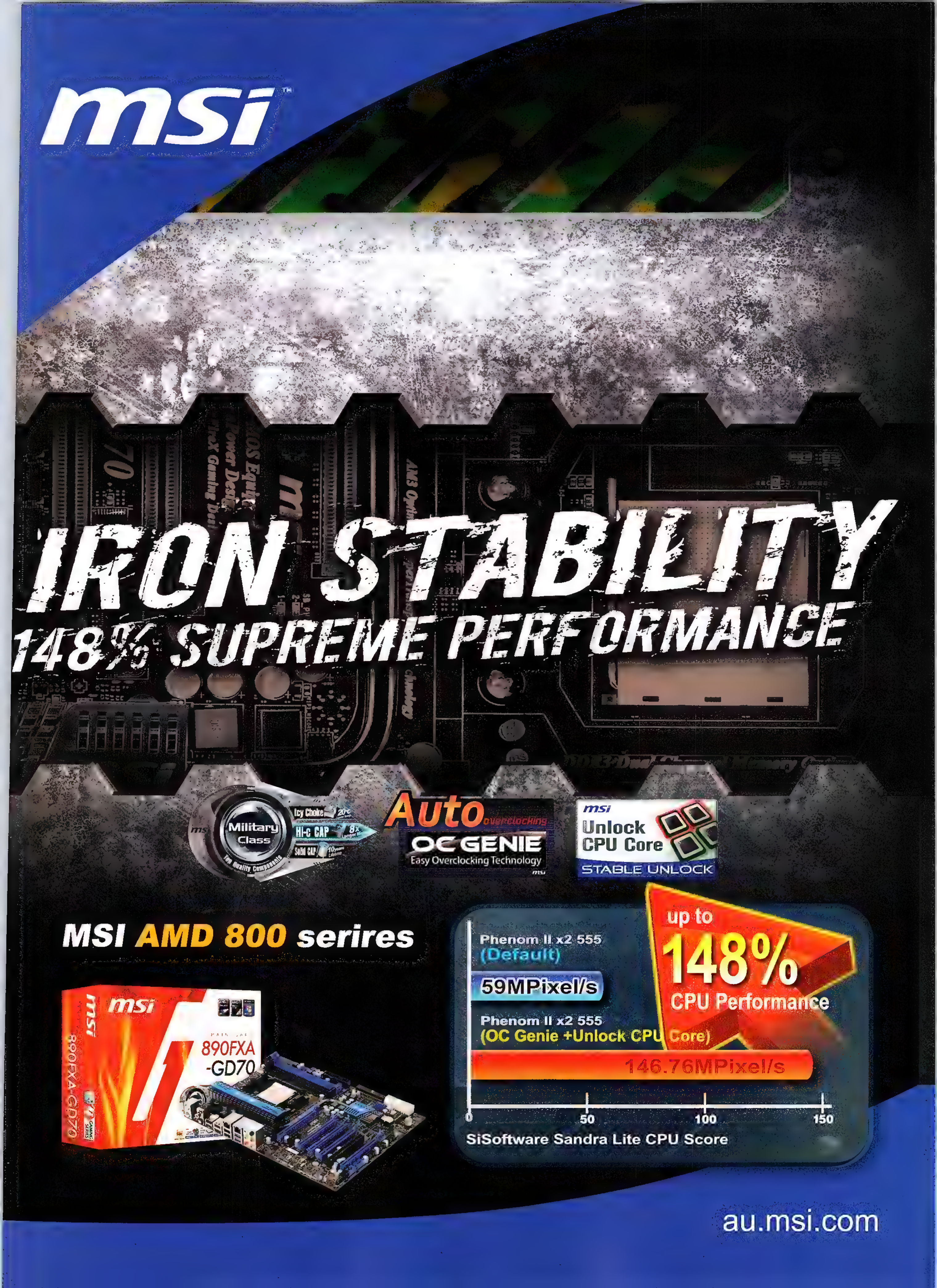
As with the 5770, though, the 5830 lacks the graphics horsepower to contend with demanding DirectX 10 games. In Crysis, for example, the performance difference between the 5830 and 5770 is less than 10 per cent, so the game was unplayable at any of our test settings. Dawn of War 2 is a struggle too. Therefore, while the 5830 offers a significantly faster average frame rate, the minimum frame rate isn't much faster. The marginal performance jump is also apparent in Battlefield: Bad Company 2, with the 5830 offering so little additional performance that both cards are still limited to playing the game smoothly at the same test setting – 1920 x 1200 without any AA.

Despite costing $95 less than the 5850, the 5830 performs closer to the $105 cheaper 5770, and as a result, struggles to justify its cost. A higher price should produce far more performance than the 5830 delivers. The variability between partner cards adds a lot of uncertainty to the 5830 too – we can't review every card on the market and some will be louder or quieter depending on the cooler being used, and consume more or less power depending on different power circuitry.

If you're looking for a card that can comfortably game at higher resolutions than the 5770 can manage, you should consider the slightly more expensive 5850, which delivers far greater performance, thanks to its more balanced design. **HB**



Pros	Cons
Good 'medium' performance	Poor 'high' performance
Slightly faster than 5770	Only slightly faster than 5770
Many different designs	Poor value


msi
IRON STABILITY
148% SUPREME PERFORMANCE
Military Class
Icy Choke
Hi-c CAP
Solid CAP
Top Quality Components
Auto overclocking
OC GENIE
Easy Overclocking Technology
msi
Unlock CPU Core
STABLE UNLOCK
MSI AMD 800 serires
msi
890FXA-GD70
Phenom II x2 555
(Default)
59MPixel/s
Phenom II x2 555
(OC Genie +Unlock CPU Core)
146.76MPixel/s
up to
148%
CPU Performance
0
50
100
150
SiSoftware Sandra Lite CPU Score
au.msi.com

ATI Radeon 5850

Strikes the ideal balance between performance and price.

Street Price $380

The ATI Radeon 5850 is the more reasonably priced high-end sibling of the Radeon 5870. It's been on the market for more than six months, and continues to offer a great balance between performance and price.

Like all of the Radeon 5000-series cards we're looking at in this Head2Head, the 5850 is based around the Cypress GPU, this time dubbed Cypress Pro. Unlike the overly cut-down 5830, the 5850 retains all the back-end finery of the high-end 5870 and sports a full complement of 32 ROPs and a full 256-bit memory interface. There have been cuts elsewhere in the GPU, though, so the 5850 has 1440 stream processors split across 18 clusters compared to the 5870 with 1600 stream processors split across 20 clusters.

While this is only a drop of 10 per cent in the overall number of stream processors, the 5850 also has reduced clock and memory speeds, with a core clock of 725MHz compared to the 5870 at 850MHz, while the 1GB of on-board GDDR5 is clocked at 1GHz (4GHz effective) compared to the 5870's 1.2GHz (4.8GHz effective) memory.

However, these cuts have allowed the 5850 to be squeezed onto a smaller PCB, with the dual-slot card measuring 240mm in length, which is considerably smaller than the 280mm-long 5870. While the 5850 consumes less power than the 5870 and boasts a TDP of 151W, it still requires two 6-pin PCI-E connectors to feed it, although this has become fairly standard for high-end cards in the past few years. The smaller PCB size also sees the use of a smaller cooler and, while the basic design is similar to that of the 5870, with a black plastic shroud covering the cooling fins beneath, the two PCI-E power sockets on the 5850 are on the end of the card rather than the top, making the rear ventilation holes purely aesthetic features.

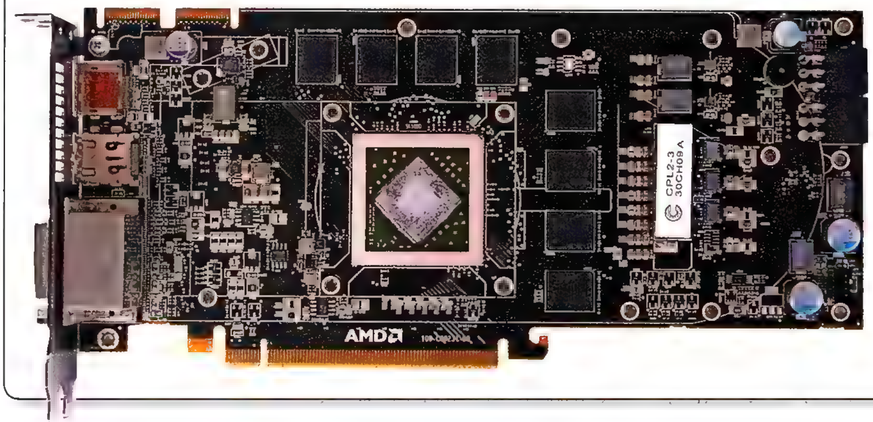
On paper, the 5850 should be around 20 per cent slower than the 5870, thanks to its reduced clock speeds and stream processor count, but it still performed remarkably well right across our batch of benchmarks. Dirt 2 was perfectly playable up to 2560 x 1600 with 4x AA, with a minimum frame rate of 35fps, a great feat for such a reasonably priced card. STALKER: Call of Pripyat also ran well and was playable at 2560 x 1600 with a minimum frame rate of 28fps, an improvement of more than 50 per cent over the $180 5770.

Unlike the cheaper Radeon 5830 and 5770, the 5850 also delivers playable frame rates in the very demanding Dawn of War 2 benchmark, with a minimum frame rate of 27fps at 1920 x 1200 without AA. Enabling AA pushes the minimum frame rate below what we'd call playable, even at 1680 x 1050. Crysis at very high detail is too much for the 5850 – the best it can muster is a minimum frame rate of 21fps at 1680 x 1050. Battlefield: Bad Company 2 sees the 5850 fare much better, with a substantial jump in performance over the 5770 and 5830, and a smooth minimum frame rate of 29fps at 1920 x 1200 with 4x AA.

The 5850 is also well behaved when it comes to power consumption. At idle, our test system pulled 142W from the wall, with the core temperature at a balmy delta T of 15°C, cooler than both the 5870 and 5770, with an extremely quiet fan. Under load, the system power usage rose to 237W, just 13W more than the 5770, with the GPU core temperature peaking at 49°C above room temperature.

While the card's rotary cooling fan speeds up and becomes audible at load, it isn't intrusive. In fact, the 5850's stock cooling is so good that few of the board partners ship their cards with custom coolers.

The 5850 is a great graphics card, providing an excellent balance between cost and performance. For example, it was able to smoothly play all our test games bar Crysis at 1680 x 1050 with some AA – the most common resolution for gamers. It can even play many games smoothly at 1920 x 1200, if you don't mind perhaps dropping the detail level or AA. It's also great value, delivering around 85 per cent of the performance of the 5870 for 70 per cent of the price. While not a great step up from the last generation's top-end cards, the Radeon 5850 is a fine choice for those looking for DirectX 11 graphics without needing to crack open their piggybank. **HB**

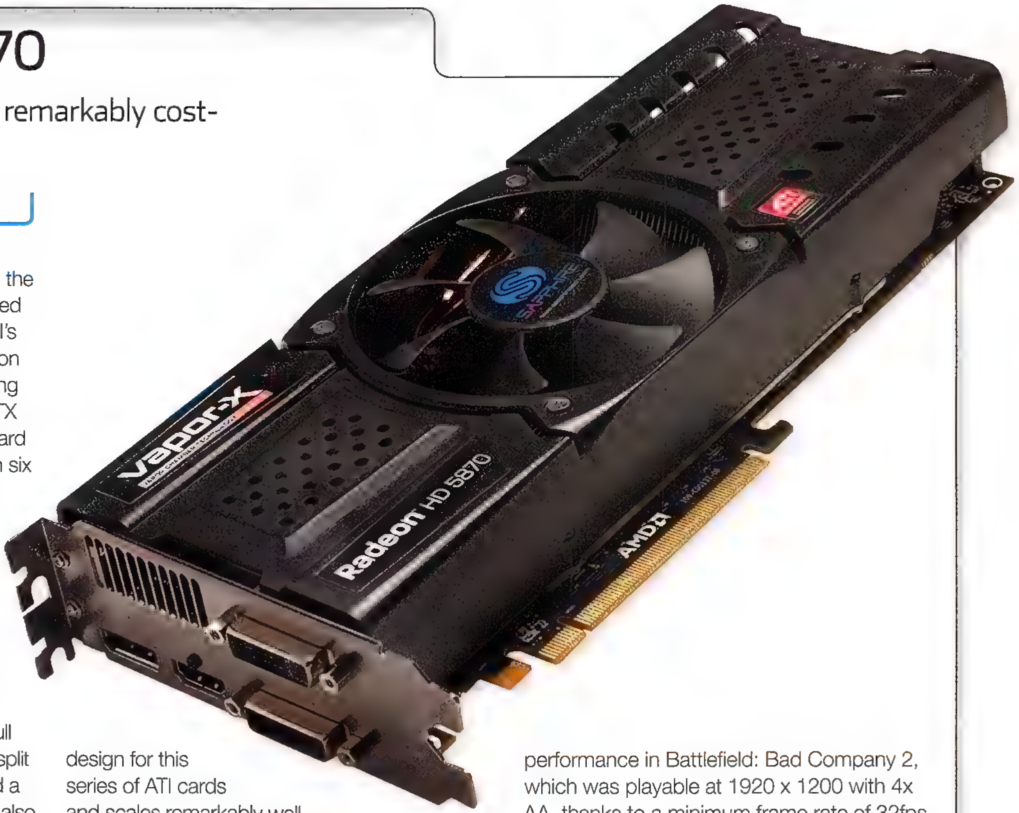


Pros	Cons
Nice 'high' performance	Won't run Crysis at full
Great price and value	
Cool, quiet and short	

ATI Radeon 5870

A great performer that's also remarkably cost- and power-efficient.

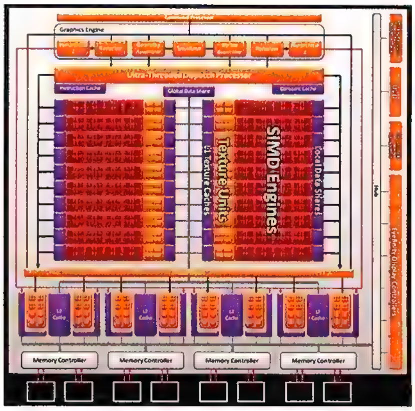
Street Price $500



The ATI Radeon 5870 was the first shot in the current round of the GPU war, and was fired last October to announce the arrival of ATI's range of DirectX 11 GPUs. While its position as the fastest single-GPU card is now being disputed by the newly arrived GeForce GTX 480, the 5870 is still a seriously capable card despite having been on sale for more than six months.

As with all the single 5000-series GPUs we're looking at in this Head2Head, the 5870 is based on the 40nm Cypress architecture, with this particular model dubbed Cypress XT. As this is the flagship GPU for the range, everything is dialled up to 11 with none of the cutbacks of cards further down the range. This means that it has a full stream processor count of 1600, which is split between 20 stream processor clusters and a full accompaniment of 32 ROPs. The card also boasts four 64-bit memory controllers, giving it a 256-bit memory interface, paired with 1GB of GDDR5 clocked at 1200MHz (4800MHz effective). This results in a theoretical memory bandwidth of 154GB/sec.

Due to the increased thermal and power demands of the Cypress XT GPU, the 5870 needs a large amount of cooling and power delivery circuitry. This necessitates a 280mm-long PCB, which means that the 5870 may struggle to fit into small cases. Power is supplied by two 6-pin PCI-E power connectors situated on the top of the card, leaving the air vents at the rear of the card free to allow improved airflow to the cooling fan. Air is then blown down the length of the dual-slot card beneath the black plastic shroud and through the cooling fins fitted on top the GPU, before being exhausted out of the card's rear backplate. This is the standard design for this series of ATI cards and scales remarkably well between the diminutive 5770 and this far larger 5870, considering the TDP of the 5870 sits at 188W.



With its position as the flagship single GPU card from ATI, the 5870 doesn't disappoint when it comes to performance. It had no trouble playing Dirt 2 at 2560 x 1600 with 4x AA, managing a minimum frame rate of 41fps, 10 per cent faster than both the 5850 and the similarly priced GeForce GTX 470 (see p92). The GeForce GTX 480 was notably faster in this test, however, with a minimum of 46fps, an increase of 12 per cent. In STALKER: Call of Pripyat, the 5870 was superb, delivering a perfectly playable minimum frame rate of 34fps at 2560 x 1600. This is a good 13 per cent faster than the GeForce GTX 480 and is more than 20 per cent faster than the 5850. The GTX 470, which is priced against the 5870 at $475, is a massive 41 per cent slower in the same test.

It isn't such a clear win for the 5870 in Dawn of War 2 though; while the 5870 performed very well without AA, producing a playable minimum frame rate of 34fps at 1920 x 1200, it suffered more of a performance hit than the GeForce cards when AA is turned on. This meant that at 1920 x 1200 with 4x AA, the 5870 trailed the GTX 470 by 14 per cent.

The 5870 is great at Crysis, though, managing to deliver playable performance at the very high detail settings, albeit at 1680 x 1050 without any AA, achieving a minimum frame rate of 26fps. Even with AA enabled, the 5870 was faster than the GTX 470, and frequently faster than the much more expensive GTX 480. The 5870 again delivered great performance in Battlefield: Bad Company 2, which was playable at 1920 x 1200 with 4x AA, thanks to a minimum frame rate of 32fps. However, the GeForce GTX 470, having trailed in almost every other test, was faster than the 5870 in Bad Company 2 with anti aliasing, gaining a performance edge of up to 15 per cent.

Unlike the newly launched GeForce cards, the 5870 isn't greedy when it comes to its cooling and power consumption. In our test rig, it had an idle delta T of just 19°C and idle system power consumption of 145W, and at load the GPU reached only 51°C above room temperature with an audible but far from annoying cooling fan. Under load, our test system drew 276W from the mains, a full 65W less than the GTX 480.

While some people will baulk at spending $500 on a graphics card, the 5870 is the best card from the current crop on which to spend your cash. Performance is superb right up to 2560 x 1600 in some games, but the ideal resolution for this card is 1920 x 1200, where you'll be able to turn on 4x AA or even 8x AA and still have smooth and playable frame rates in most games. Unlike the two new GeForce cards with which it competes, the 5870 runs comparatively cool, draws a lot less electricity when gaming and has a reasonably quiet cooler. If you're shopping for a high-end graphics card then this is the one to buy. **HB**

Pros	**Cons**
Great 'high' performance	Can become quite warm
Decent price and value	Struggles with AA at higher resolutions
Good power consumption	

Eyefinity Explored

Trawl a few forums for advice on which high-end graphics card to buy at the moment and you'll probably hit a torrent of scorn that implies you're wasting your money, that the consoles are holding back PC game engine development and that you're the embodiment of Zombie Hitler in disguise (there's always someone who has to lower the tone).

Hitler jibes aside, the rest of the criticism is bad news if you're a graphics card manufacturer, and it's worse if you make GPUs. The obvious answer to the problem (perceived or real) of stagnation in pixel-processing finesse is to develop some kind of technology that raises the number of pixels to process – enter ATI's Eyefinity.

Eyefinity was introduced in September 2009 with the first Cypress GPU, which powered the Radeon 5870. The technology allows ATI cards to output to several different displays at the same time, creating one super-large image.

The difference between Eyefinity and earlier multi-monitor gaming setups is that Eyefinity is an actual standard, supported by a wide range of games. In contrast, if a game developer wanted to support multiple displays in the past, it would have to develop the code itself.

In theory, any 5770 card or above can support up to three-screen Eyefinity, while a special card known as the '5870 Eyefinity 6 Edition' can support up to six screens.

THREE-SCREEN EYEFINITY

You need to remember a few things when it comes to buying a three-screen Eyefinity setup, the first of which is that you'll need all three monitors to be the same resolution. The second thing to remember is that you'll have to use at least one DisplayPort output.

If you're buying your screens from scratch, just make sure at least one of your screens has a DisplayPort input, otherwise you'll need an active adaptor to convert the DisplayPort signal into something that an HDMI, DVI or D-Sub port can understand.

With three screens you'll also need a large desk – there's probably no need to invest in a fancy multiscreen VESA mount, as they can simply sit on the desk next to each other. Once you've checked that you have the right cables, connectors and stands, you're ready to go.

For our testing, we used three NEC MultiSync EA231Wmi 23in widescreen monitors, hooked up to a standard 5870. The NEC screens have the 16:9 form factor with a resolution of 1920 x 1080, typical of many modern monitors, so we focused on this resolution.

We chose not to use bezel correction, as this would allow us to use a resolution of exactly 5670 x 1080 for every test, no matter which card we used. Had we not done so, each manually defined, bezel-corrected setup might have differed from the next in resolution – bezel correction forces the PC to render and draw the pixels behind the bezels to produce the effect of looking through a paned window.

SIX-SCREEN EYEFINITY

The Eyefinity 6 card differs from a standard Radeon 5870 in two ways. First, it has 2GB of GDDR5 memory rather than 1GB (it still runs at the usual 1.2GHz, or 4.8GHz effective), and secondly has six mini-DisplayPort outputs rather than a jumble of standard-sized connections. As mini-DisplayPort ports are so small, ATI can line them up and leave the entire second slot's worth of backplate clear as an exhaust for the fan.

The addition of extra memory obviously leads to an increase in the cost of the card, although we doubt that the extra memory alone accounts for the $150 price difference between a 5870 (at around $500) and the cheapest Eyefinity 6 card. Part of the high price of an Eyefinity 6 card might be accounted for by the five adaptors that ATI says will be in Eyefinity 6 boxes. There will be two mini-DisplayPort to DisplayPort dongles, two passive mini-DisplayPort to (single-link) DVI dongles and a passive mini-DisplayPort to HDMI dongle.

A passive DisplayPort adaptor performs no signal conversion work, so it can only be connected to one of the DisplayPort outputs that supports legacy connections such as HDMI, DVI and D-Sub. An Eyefinity 6 card has two of these – to use more than two legacy connections, you'll need to buy an active adaptor from ATI's list of qualified active DisplayPort adaptors.

The Eyefinity 6 card should include passive adaptors to let you connect two non-DisplayPort screens, which should get you up and running reasonably quickly. We advise thinking ahead when it comes to cabling, though, as some monitors have DisplayPort and HDMI cables in the box, and you can buy cheap cables online for well under $20 each.

Unlike three-screen Eyefinity, you'll also need to invest in a stand, though six-screen stands are not stocked locally in Australia. Including a six-screen stand in the purchase price blows out the cost significantly, and even purchasing three dual-screen vertical stands means that six-screen Eyefinity is exponentially more expensive than three-screen Eyefinity.

GAMING WITH EYEFINITY

Eyefinity works by grouping multiple displays into one Single Large Screen (SLS) for the graphics card to work on; as a result, it requires all the screens in the group to have the same resolution, orientation and colour depth.

This means that Eyefinity can't support the old flight-sim trick of having one 24in landscape screen between two 20in screens in portrait. The upshot of Eyefinity's enforced conformity is that if you're using three widescreen displays, the viewable area of the game becomes incredibly wide and really fills your peripheral vision.

With three screens, it's natural to bend the left and right displays to make a concave arrangement of TFTs. This works well with games that use a first- or third-person view, as the viewport (the portion of the game that's drawn and displayed) has an element of wraparound at very wide aspect ratios. You can see cars coming up alongside you when driving, or comrades running up to support your flank with some covering fire.

However, this arrangement is less than ideal when you switch to an isometric viewpoint. Such viewpoints want to treat the viewed area as flat, so by bending in the displays, there are weird distortions, such as buildings with walls at 45-degree angles. When we were playing Dawn of War II, we moved the left and right screens to be flat with the central screen and saw this effect disappear. However, our display was now several feet long, which meant that we had to crane our necks, or even move our chairs, to see detail at the extreme left or right of the screen.

Our experience of three-screen Eyefinity was positive – size matters, and many games do benefit from the enlarged viewing area. While there are a few niggles with certain games – for example, the menu of Bad Company 2 didn't stretch properly, so the cursor wasn't aligned with the menu, and we had trouble applying the 5760 x 1080 resolution – we missed the second and third screens when we removed them.

This is an indication that a technology is at least partly successful, and it's a much better reaction than we've had to NVIDIA's 3D Vision – for many people, it's frankly a relief to finally take off the bulky 3D Vision glasses. Going from Eyefinity to just a single screen feels like going from a widescreen monitor to a 4:3 screen.

However, our enthusiasm is tempered by the fact that Eyefinity is a pain to set up and live with. Beyond the obvious cost issues, there's the amount of desk space that the screens occupy, and the feeling that three widescreen monitors placed side by side is too wide. We found that our peripheral vision really only extended about halfway across the side screens, and that the screens looked too skinny vertically (possibly a consequence of their 16:9 aspect ratio).

While the two pillars of double-thick bezels to either side of the central screen didn't bother us much, we hope that someone follows Philips' lead with 21:9-aspect TVs, and makes a super-widescreen monitor. We've seen Alienware demo something like this, but that project has since been abandoned.

In contrast, we found six-screen Eyefinity to be a horrible mess. It takes hours to set up correctly, and once you finally have it up and running, it's hard to enjoy the experience, as your eyes are constantly drawn to the double width horizontal and vertical bezels – particularly the former, which are right in your eyeline. This is a massive problem in many games, as it's where the horizon is located. It's also a problem in Windows, as nearly all dialogue boxes are centred on the screen and are partially obscured by the bezels.

PERFORMANCE

As six-screen Eyefinity is so unpleasant to use, and we'd never recommend it, we only benchmarked the 5870 Eyefinity 6 card in three-screen mode. We also tested a standard 5870 and 5970 to see whether the additional RAM of the 5870 Eyefinity 6 card is worth paying for.

We'll start with Dirt 2, as this game is a posterchild for DX 11 and was the most controversial during testing. The 5870 Eyefinity 6 card seemed to fare very well in this game, managing higher frame rates than even the dual-GPU Radeon 5970. However, this was due to the Catalyst 10.3a BETA driver we had to use with the Eyefinity 6 card, which also contains some huge Dirt 2 optimisations – we tried the 5870 with the Catalyst 10.3a driver and found that it achieved the same high frame rates as the Eyefinity 6 card.

Most of the other game tests showed no difference between the Eyefinity 6 card and the standard 5870 on our three 1920 x 1080 screens. STALKER: Call of Pripyat showed no improvement with the extra 1GB of memory of the Eyefinity 6 card, and neither did Battlefield: Bad Company 2. It's also worth noting that the dual-GPU Radeon 5970 was significantly faster than either card in many games, although it refused to work in Crysis at the Eyefinity resolution of 5760 x 1080.

Even in games where we saw some advantage from the Eyefinity 6 card's 2GB of memory, it was only when we applied 4x AA. For instance, In Dawn of War II: Chaos Rising, the Eyefinity 6 card performed identically to a 5870, with a minimum of 24fps and an average of 43fps. When we turned on AA, the performance of the standard 5870 dropped to a minimum of 13fps while the Eyefinity 6 card could generate a minimum of 15fps.

The Eyefinity 6 card's extra memory causes its GPU to be 3°C hotter than the standard 5870, and consume 9-10W more power. If you're concerned about 10W of power draw then you'll also be shocked when you consider that we also had to power three screens. The slightly higher temperature places the Eyefinity 6 card in line with the 5970, but none of the cards mentioned become overly hot. However, the Eyefinity 6 card's cooler produces a louder, whinier noise than that of the standard 5870.

WORTH IT?

Using three 1920 x 1080 screens provides the largest practical amount of screen space with which to expand your view in games. This is because six-screen Eyefinity, at least with current monitors and thin bezels, is extremely unpleasant for playing games. Given that most games ran no faster on the special 5870 Eyefinity 6 card, this means that if you want to go down the Eyefinity route, we suggest using three screens and a standard 5870 or 5970.

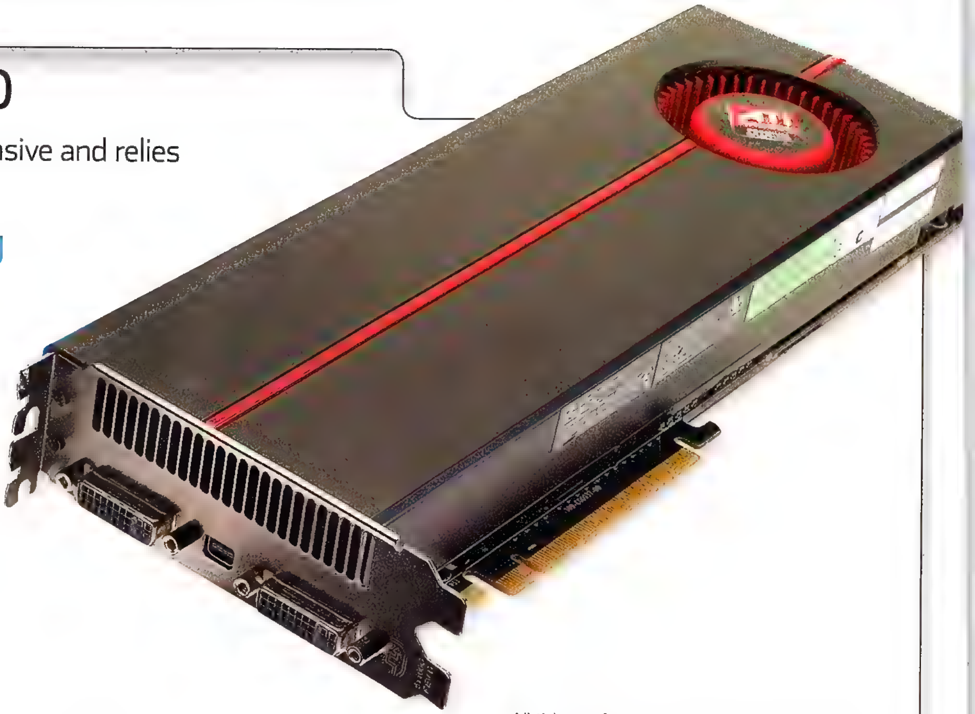
Don't confuse our lack of enthusiasm for the Eyefinty 6 card with Eyefinity entirely. While three-screen Eyefinity gaming certainly has a few niggles, and game support isn't totally comprehensive, we experienced a sense of loss when we went back to single-screen gaming. It was like being back in the days when 16:10 monitors and widescreen gaming was taking off; going back to the smaller screen feels restrictive. It's also worth mentioning that NVIDIA have a similar competing technology to Eyefinity, called Surround Gaming.

Ultimately, while we'll give the Eyefinity 6 card and six-screen Eyefinity a miss, we hope that ATI and game developers pursue and refine Eyefinity as a technology.

ATI Radeon 5970

A truly powerful card, but expensive and relies heavily on driver updates.

Street Price $830



Like every other DirectX11 ATI graphics card we've got on hand in the Labs, the 5970 is based around a version of the 40nm Cypress GPU, or rather a pair of them that have been rebadged as Hemlock XT.

As with the 5870, both the 5970's two GPUs are full-fat Cypress GPUs, packing a full complement of 1,600 stream processors split across 20 stream processor clusters. Each GPU also includes a full back-end of 32 ROPs and four 64-bit memory controllers, giving the card two 256-bit memory buses. Continuing the trend of doubling up, the 5970 is also equipped with 2GB of GDDR5, with 1GB for each GPU.

However, the 5970 isn't quite as simple as two 5870s stuck together. The thermal demands of a dual GPU card mean that there have had to be some cutbacks when it comes to clock speeds. This means that despite having a GPU that physically resembles the 5870, the 5970's GPUs are both clocked at 725MHz and the RAM at 1GHz (4GHz effective), the same frequencies as the 5850.

The 5970 is a whopping 305mm long, which means that you'll need a very roomy case to accommodate it. It's also a very power-hungry card – there are both 8-pin and 6-pin PCI-E power connections, with both sockets located on the top of the card to supply the 294W of power needed to meet the TDP. This leaves the rear of the card open for improved airflow to the cooling fan, tasked with blowing air down the card and out through the rear backplate. The dual-slot cooler is a scaled-up version of that found in the rest of the Radeon 5000-series range, and the increased thermal load means that the fan has to spin faster to keep the GPUs at a safe temperature.

As you'd hope, the 5970 crushed every other card from this generation in the vast majority of our tests. In Dirt 2, it delivered a silky-smooth minimum frame rate of 57fps even at the highest setting of 2560 x 1600 with 4x AA, 24 per cent faster than a 5870. STALKER: Call of Pripyat sees a similar gulf in performance, with the 5970 delivering a minimum frame rate of 53fps at 2560 x 1600 compared to the 5870's 34fps minimum frame rate in the same test.

It isn't such good news in Dawn of War 2: Chaos Rising. As the 5970 runs two GPUs, it's reliant on driver updates and game support for much of its performance and it's clear that in this game, the payoff is missing. The game was playable at 1920 x 1200 without AA, with a minimum frame rate of 28fps, but this is the same frame rate as the cheaper single-GPU 5850 achieved.

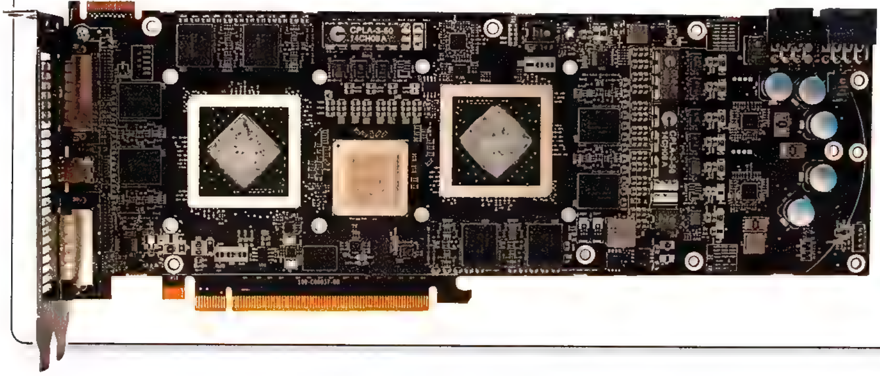
The card fared much better in Crysis, and it's in this game that the 5970 really shines. If you want to run Crysis at its absolute, no-compromise best, the 5970 is the card to have – both the 5870 and GTX 480 lag behind. The 5970's awesome performance continues in Battlefield: Bad Company 2. Frame rates at even the highest resolutions and anti-aliasing settings were smooth, with a minimum of 34fps at 2560 x 1600 with 4x AA – 26 per cent faster than the next fastest card, the GeForce GTX 480.

All this performance comes at a price, and not surprisingly, the 5970 is a very power-hungry card. Our test system drew 168W from the wall when idle and a whopping 352W under load, although this is still a few watts shy of the energy-guzzling GTX 480. The two GPUs don't become too hot, though, with delta T temperatures of 26°C at idle and 54°C at load; these aren't far off the comparatively puny 5770.

However, there's a price to pay for these low temperatures – like the GTX 480, the 5970 is very noisy under load. It will easily intrude on gaming if you use speakers, and is audible from more than six feet away inside a sealed case.

Overall, our tests show 5970 is the fastest graphics card on the market today and when the ATI driver profiles are working properly, it offers around 30 per cent additional performance over both the GTX 480 and 5870. However, this extra performance doesn't come cheap, and at roughly $830, this card is probably too expensive for all but the most hard-core PC gamer.

Neither is the 5970 perfect, as you need a waterblock to reduce the noise level to an acceptable level. We recommend a custom water cooling setup, which we explained in Issue 3 of KitLog (**www.atomicmpc.com.au/?169799**). If you're set on gaming at 2560 x 1600 then only the 5970 will do the job, as the single-GPU graphics cards don't have the horsepower to render games smoothly at this resolution. **HB**



Pros	Cons
Highest performance single card	Can run hot and loud
Can run Crysis. Really well.	Very expensive
	Reliant on driver support

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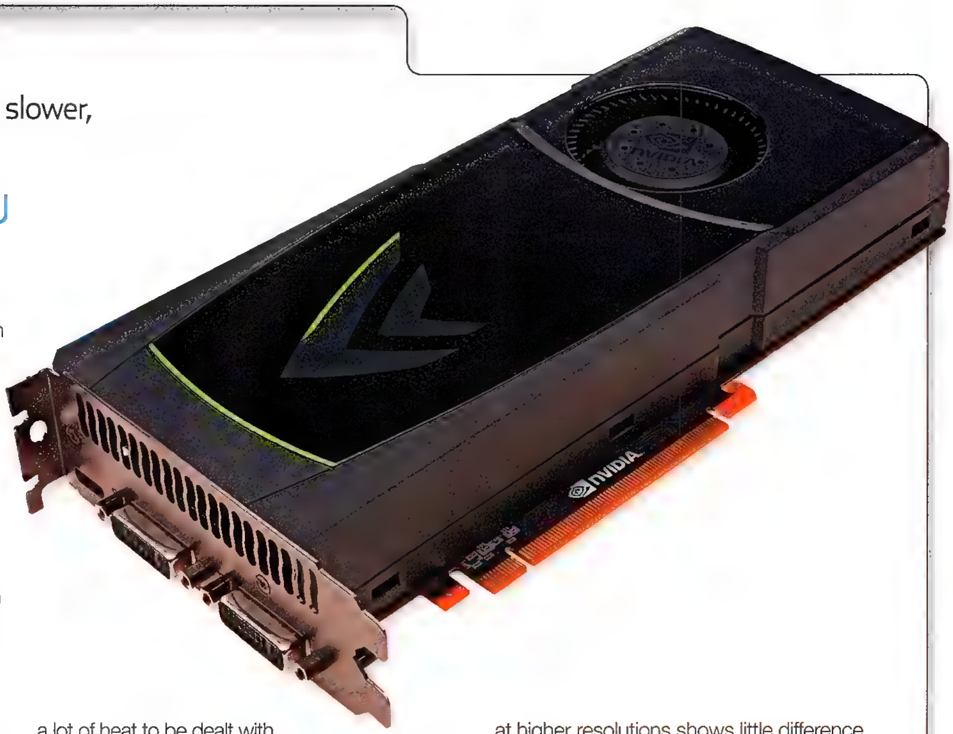
TOMORROW'S TECHNOLOGIES TODAY!

NVIDIA GTX470

Similar in cost to the 5870, but slower, noisier and hotter.

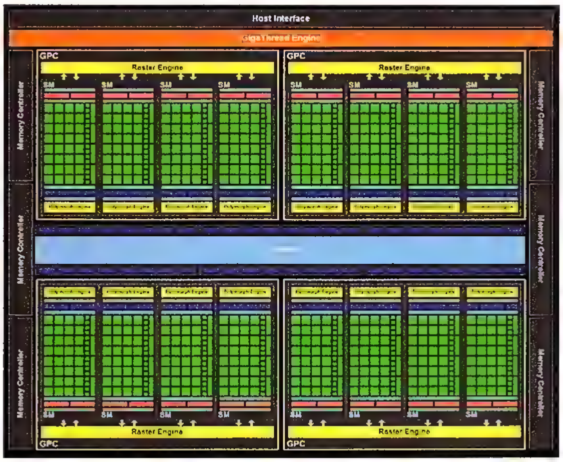
Street Price $475



While the GTX470 boasts a similarly sized 3 billion transistor GF100 'Fermi' GPU to that of the GeForce GTX480, an additional stream processor cluster has been disabled to drop the overall stream processor count to 448. The operating speed of these stream processors has also been cut down to 1215MHz – a drop of just over 13 per cent. Similarly, the rest of the core's operating speed has also been cut by 15 per cent to 607MHz, compared to 700MHz on the GTX480.

The GPU's back-end has been cut down too, with one of the six 64-bit memory controllers disabled, reducing the memory bus to 320 bits. The loss of the memory controller means that the card is able to address two fewer 128MB GDDR5 modules, dropping the card's memory down to 1280MB. The memory speed has also been reduced to 825MHz (3.3GHz effective). The loss of the memory controller sees the number of ROPs reduced by eight to a total of 40.

The GTX470 is a comparatively svelte 240mm long, and the griddle-like heatsink of the GTX480 has been replaced by a smooth black plastic shroud. Underneath are five direct-contact heatpipes, plus a heatsink to channel out heat from the GPU's integrated heatspreader. A fan blows air down the length of the card, through the cooling fins and out the rear backplate, while a separate aluminium plate cools the ten 128MB GDDR5 modules and power delivery circuitry. The drop in power demand also means that the GTX470 requires two 6-pin PCI-E connectors. While the GTX470 doesn't run a full-size GF100 die, the TDP is still high at 215W. There's still obviously a lot of heat to be dealt with, though, as the PCB also has a large cut-through section behind the fan to improve airflow through the card.



The GTX470's release is so late that despite it being pitched at the same price as the 5870, it actually performs more like the cheaper 5850. This was certainly the case in Dirt 2, where the GTX470 delivered playable performance at 2560 x 1600 with a minimum frame rate of 37fps – 2fps faster than the 5850 and 4fps slower than the 5870.

The card fared even worse in STALKER: Call of Pripyat, where the GTX470's performance was closer to that of the $285 5830 than the similarly priced 5870. It still delivered playable performance at 1920 x 1200 with a minimum frame rate of 39fps, but at the same resolution, the 5850 was 13 per cent faster and the 5870 30 per cent faster.

In Dawn of War: Chaos Rising, the GTX470 produced a playable minimum frame rate of 28fps at 1920 x 1200 without AA, but this is only 1fps faster than the 5850 and 6fps slower than the 5870. Performance when anti-aliasing was enabled was much more in favour of the NVIDIA cards though – with 4x AA, the GTX470 was faster than the 5870.

Crysis at very high detail is still the biggest challenge for GPUs and, like the 5850, the GTX470 failed to produce playable frame rates at any of our test resolutions, with a minimum frame rate of 21fps at 1680 x 1050 without any AA. Even looking through the results at higher resolutions shows little difference between the GTX470 and the 5850.

In Battlefield: Bad Company 2, the GTX470 delivered a playable minimum frame rate of 26fps at 2560 x 1600 without AA, slightly slower than the 5850. The GTX470 is superior when anti-aliasing is enabled, outperforming the 5870 by more than 15 per cent at 1920 x 1200 with 4x AA.

Despite its lacklustre performance, the GTX470 is right up there with the GTX480 when it comes to power consumption and heat. Our test system pulled a massive 341W from the wall, while the GPU reached a whopping 72°C above room temperature at load. The fan is also brutally loud, much more so than the fans of the 5870 and 5850, although thankfully it's quieter than the GTX480.

As the two cards won't leave you much change from $500, the GTX470 should be compared to the 5870, a battle in which the GTX470 loses on almost every front. For the most part, it's 10 per cent slower than the 5870, and in some instances, it's as much as 30 per cent slower than its seven-month-old ATI competitor.

The only exception to this is Battlefield: Bad Company 2, but one game isn't enough to make us recommend the GTX470; especially when you factor in its high power consumption and heat levels, as well as the noisy cooler. **HB**

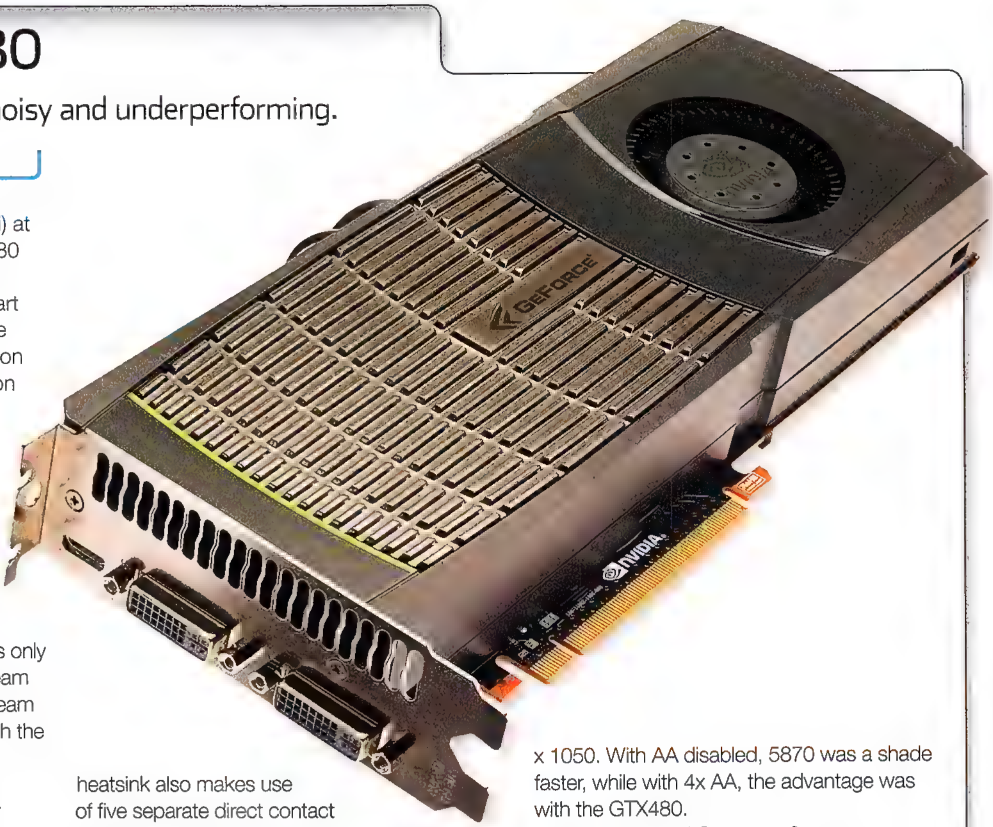
Pros
- Great 'medium' performance

Cons
- Runs hot and loud
- Poor value
- High power consumption

NVIDIA GTX480

Overdue, overpriced, overly noisy and underperforming.

Street Price $670

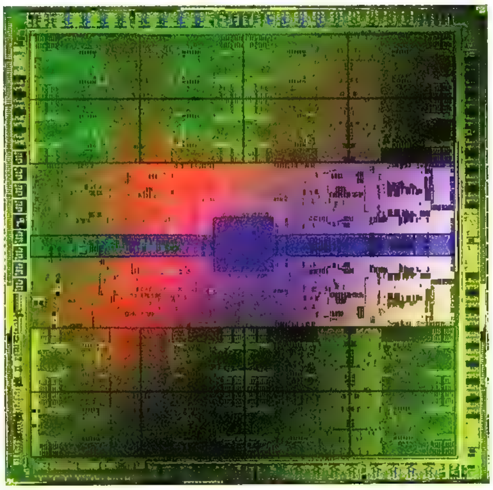


The new GF100 architecture (aka Fermi) at the heart of the NVIDIA GeForce GTX480 is a completely new design for NVIDIA, with a heavy focus on tessellation as part of the GPU's support for DirectX11. The GPU itself is massive and has three billion transistors, compared to the ATI Radeon 5870's 2.15 billion.

The GF100 design is split into four graphics processing clusters (GPCs), each of which is made up of four separate stream processor clusters; these in turn are made up of 32 stream processors. This means that a full-spec GF100 GPU will pack in 512 stream processors, although rather embarrassingly, the top-dog GTX480 has only 480 stream processors, as one of its stream processor clusters is disabled. These stream processors are clocked at 1401MHz, with the rest of the GPU clocked at 700MHz.

Integrated into the four GPCs are 60 texture units – four per stream processor cluster – and 48 ROPs, eight for each of the GPU's six 64-bit memory controllers. This gives the GTX480 a 384-bit memory interface through which to address the card's 1536MB of GDDR5, which is clocked at 925MHz (3.7GHz effective). The idea behind the modular GPU design is that individual stream processor clusters, or entire GPCs, can be removed to allow the NVIDIA to sell cut-price versions that have lower performance. This wasn't possible with the GT200, NVIDIA's last GPU architecture.

At 267mm long, the GTX480 is slightly shorter than the 5870, but its dual-slot cooler is one of the meatiest designs we've seen. Uniquely, the heatsink's top plate extends through the plastic top shroud. The heatsink also makes use of five separate direct contact heatpipes, which are similar to those found on high-end CPU coolers, to efficiently channel heat away from the GPU. Beneath the plastic shroud and flashy heatsink is a third cooling element in the form of a large aluminium plate covering the card's memory and power delivery circuitry. A hole has been cut in the PCB under the fan to improve airflow over the card, with hot air exhausted out of the rear backplate. Power is supplied via one 8-pin and one 6-pin PCI-E power connector, placed on top of the card.



Although the GTX480 is very fast, it failed to convincingly overtake the 5870 in all our benchmarks. Dirt 2 was playable right up to 2560 x 1600 with 4x AA, with a smooth minimum frame rate of 46fps – 12 per cent faster than the 5870. STALKER: Call of Pripyat didn't see the GTX480 perform so well, as it was outperformed by the 5870 at every resolution. However, this still meant that the GTX480 delivered smooth frame rates right up to 2560 x 1600, with a playable minimum frame rate of 30fps.

Dawn of War 2: Chaos Rising is one game where the GTX480 shines; its playable minimum frame rate of 29fps at 1920 x 1200 with 4x AA was comfortably the fastest in this Head2Head, thrashing the 5870 by almost 40 per cent. The same can't be said for Crysis, however, in which the GTX480 and 5870 were the same at all resolutions – neither card was able to deliver playable frame rates above 1680 x 1050. With AA disabled, 5870 was a shade faster, while with 4x AA, the advantage was with the GTX480.

Battlefield: Bad Company 2 was more of a success for the GTX480 – it easily outperformed the 5870 at every resolution above 1680 x 1050. The GTX480 even managed a playable minimum frame rate of 27fps at 2560 x 1600 with 4x AA, 17 per cent faster than the 5870.

Despite its performance lead over the 5870 in some games, the GTX480 pays for this elsewhere. While its idle power consumption isn't bad at 164W, with a GTX480 installed, our test system drew an incredible 376W at load – 100W more than the 5870. The official TDP rating is claimed to be 250W, but we recorded an actual draw of far more than this – higher than even the 5970. This means that the card runs incredibly hot, peaking at 72°C above room temperature, despite its very noisy fan.

PC enthusiasts have waited six months for NVIDIA to play its DirectX 11 hand and the result is disappointing. While the GTX480 is between 10 and 17 per cent faster than the 5870 in some circumstances, it costs $170 more, draws 100W more power at load, runs much hotter and is very noisy. To top it off, there are still extremely few GTX480s being made, so even if it was a desirable product it's still incredibly hard to purchase. **HB**

Pros
- Good 'High' performance
- Can PhysX or CUDA if needed

Cons
- Runs extremely hot and loud
- Very poor value
- Extremely high power consumption

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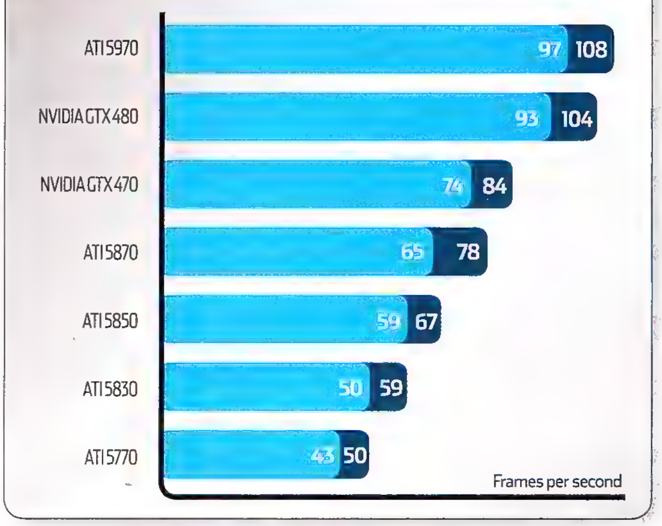
Feature Table

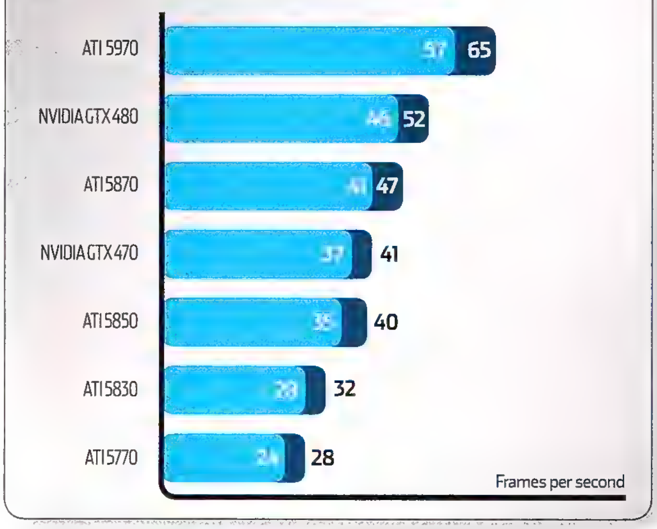
	ATI Radeon HD 5770 1GB	ATI Radeon HD 5830 1GB	ATI Radeon HD 5850 1GB	ATI Radeon HD 5870 1GB	ATI Radeon HD 5970 2GB	Nvidia GeForce GTX 470	Nvidia GeForce GTX 480
Typical street price	$180	$285	$380	$500	$830	$475	$670
GPU							
Frequency (MHz)	850	800	725	850	725	607	700
Texture processors	40	56	72	80	2 x 80	56	60
Render outputs (ROPs)	16	16	32	32	2 x 32	40	48
Stream processors	800	1120	1440	1600	2 x 1600	448	480
Stream processor frequency (MHz)	850	800	725	850	725	1215	1401
DirectX support	11	11	11	11	11	11	11
Fabrication process (nm)	40	40	40	40	40	40	40
Transistors (billion)	1.04	2.15	2.15	2.15	2 x 2.15	3	3
RAM							
Bus width (bits)	128	256	256	256	2 x 256	320	348
Effective frequency (MHz)	4800	4000	4000	4800	4000	3300	3700
Bandwidth (GB/sec)	76.8	128	128	154	2 x 128	134	177
Quantity (MB)	1024	1024	1024	1024	2 x 1024	1280	1536
Type	GDDR5	GDDR5	GDDR5	GDDR5	GDDR5	GDDR5	GDDR5
Interface							
Additional power requirements	6-pin PCI-E	2 x 6-pin PCI-E	2 x 6-pin PCI-E	2 x 6-pin PCI-E	8-pin PCI-E, 6-pin PCI-E	2 x 6-pin PCI-E	8-pin PCI-E, 6-pin PCI-E
Multi-GPU compatibility (maximum number of cards)	CrossFire (2, 3 or 4 cards)	CrossFire (2, 3 or 4 cards)	CrossFire (2, 3 or 4 cards)	CrossFire (2, 3 or 4 cards)	CrossFire (2 cards)	SLI (2 or 3 cards)	SLI (2 or 3 cards)
PCI-E version	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Number of slots, PCB length	Dual, 219mm	Dual, 240mm	Dual, 240mm	Dual, 280mm	Dual, 305mm	Dual, 240mm	Dual, 267mm

🟦 Minimum ■ Average

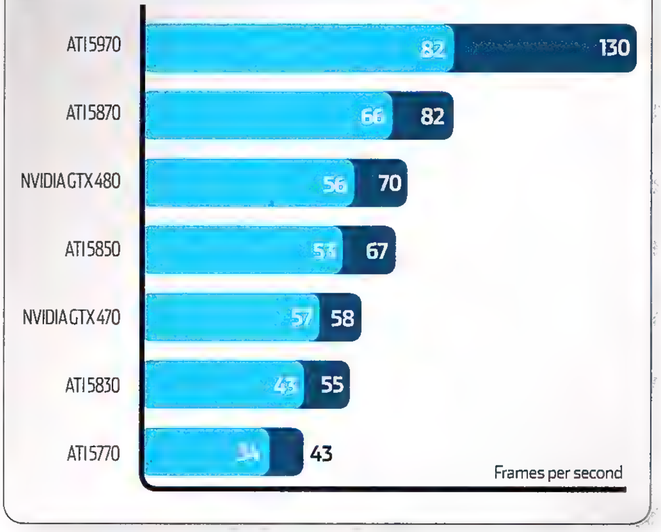
DiRT 2 1680x1050 0xAA 16xAF



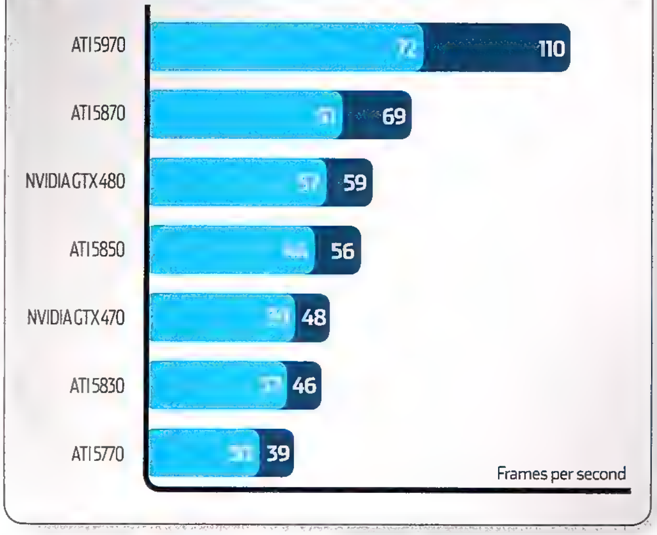
DiRT 2 2560x1600 4xAA 16xAF



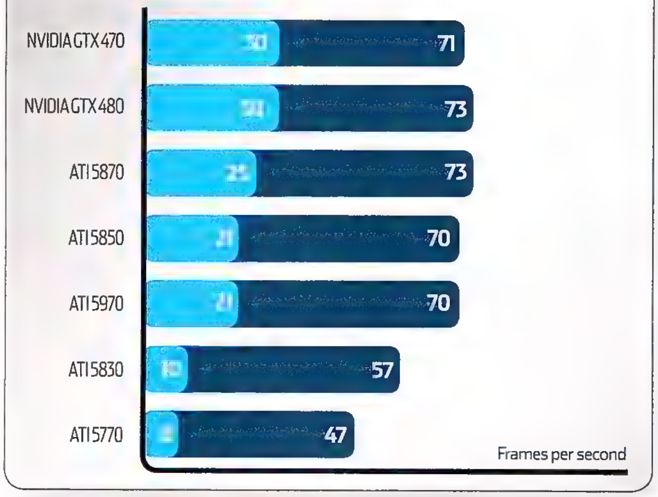
STALKER: Call of Pripyat 1680x1050 16xAF



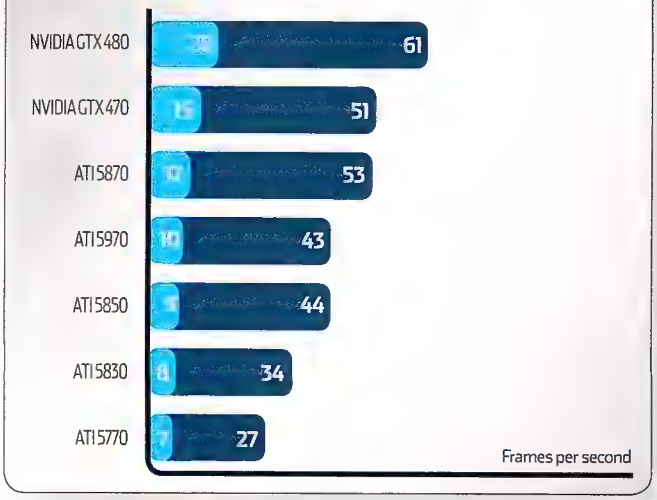
STALKER: Call of Pripyat 1920x1200 16xAF



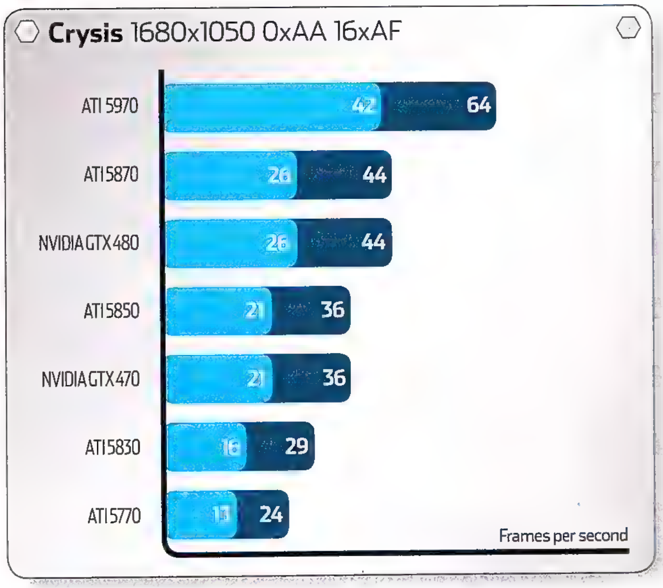
Dawn of War 2: Chaos Rising 1680x1050 4xAA 16xAF



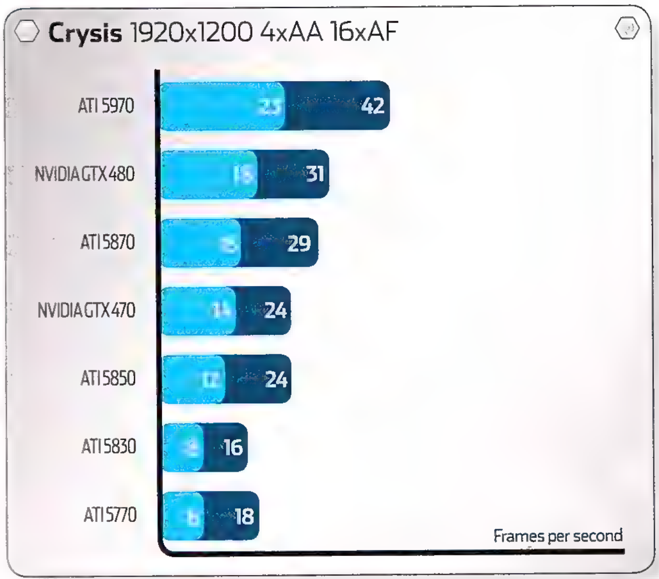
Dawn of War 2: Chaos Rising 2560x1600 4xAA 16xAF



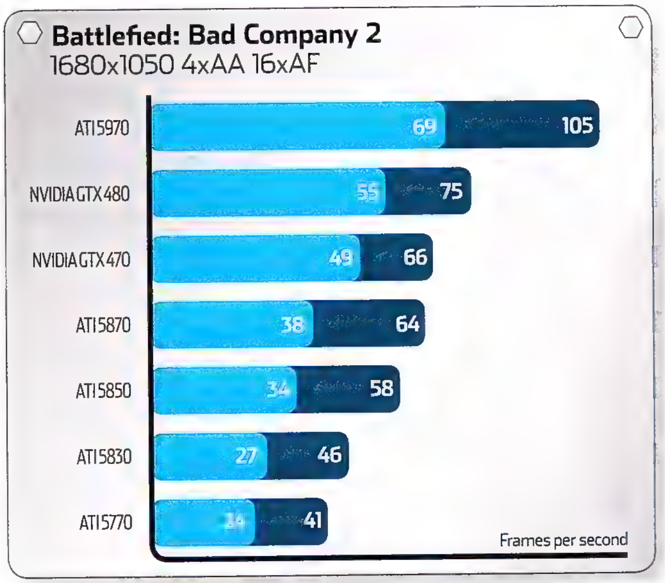
Minimum Average



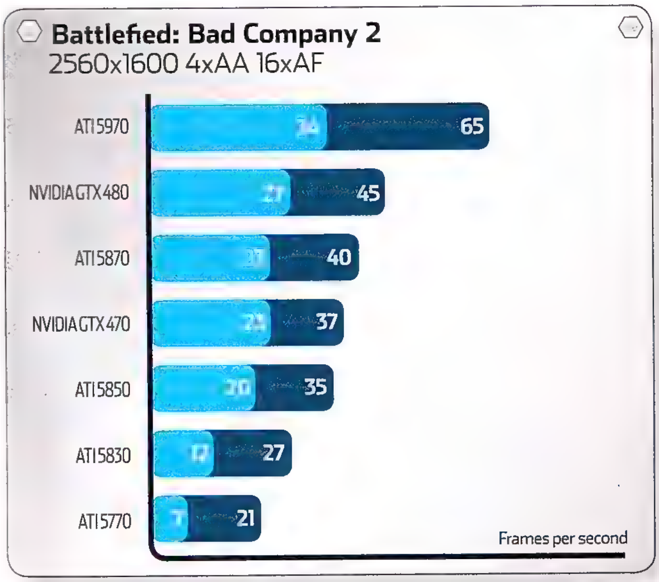
Crysis 1680x1050 0xAA 16xAF



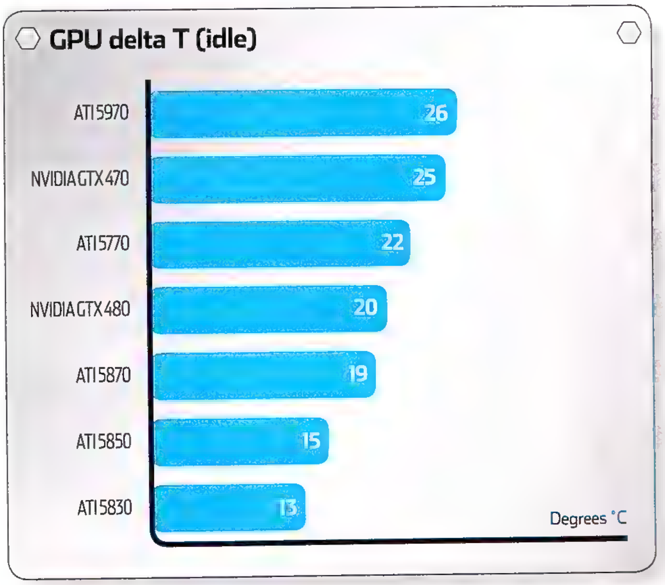
Crysis 1920x1200 4xAA 16xAF



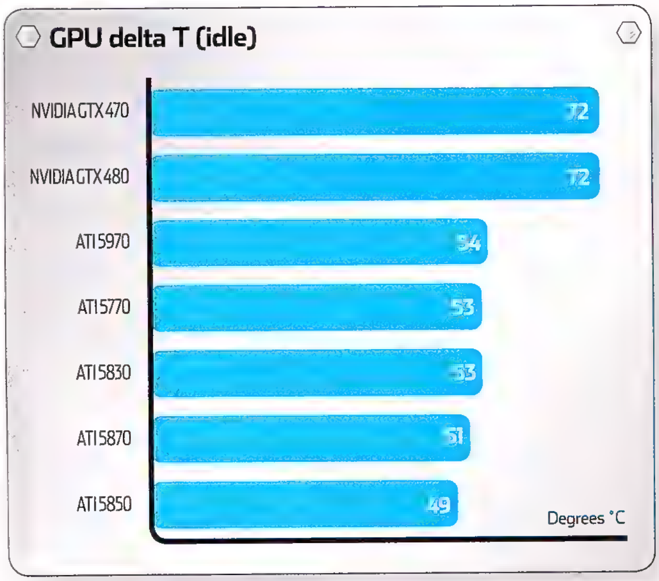
Battlefied: Bad Company 2
1680x1050 4xAA 16xAF



Battlefied: Bad Company 2
2560x1600 4xAA 16xAF



GPU delta T (idle)



GPU delta T (idle)

KITLOG

These are our four basic systems, with something for every taste. On this page, the **Basic Game Box** is put together with money-saving in mind, but also an eye to getting as much bang for buck. It's the best value system for those who want a lot of processing grunt, but who don't want to sacrifice the upgradeability or compatibility that is so important. Intel's going to keep the P55 socket around for quite some time, so making the leap to this new platform is well-timed.

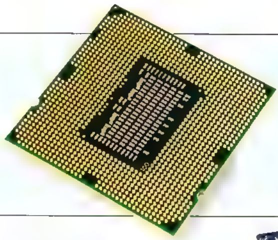
The limitations of rotating storage media are relatively plain; there's only so fast you can practically spin a disc. This means that although the hard drive is high-capacity and cheap, it isn't going to be able to touch solid state technology. After all, solid state doesn't need to spin to get moving – but it is also expensive. Seagate announced the Momentus XT recently; a fusion of cheap storage discs and faster flash to boost system speeds. One to keep an eye on.

The Perfect PC, on the other hand, is the system everyone aspires to, with nothing but the best parts – without going crazy, though. It's a collection of all the greatest hardware that we'd pick without a budget, sure to impress with performance and sheer style.

Oh, and if you're wondering what the Ref IDs are, that's the ID of that article on our website. Just enter it like this – **www.atomicmpc.com.au/?NUMBER** – and you'll go straight to that review.

BASIC GAME BOX

CPU



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Issue 106, Page 36

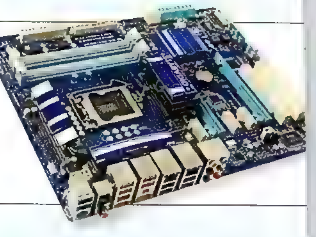
MOTHERBOARD

GIGABYTE P55-UD4

PRICE $225

A great value P55 board with some nice features..

Issue 106, Page 39



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G.Skill Ripjaws 2000MH

PRICE $190

Great value memory with amazing overclocking.

Issue 106, Page 52

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XFX 5770

PRICE $200

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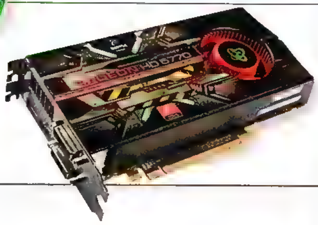
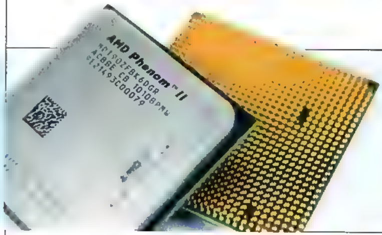


THE PERFECT PC

CPU



AMD Phenom II X6 1090T

PRICE $365

Six cores of high-powered processing joy.

Issue 114, Page 36

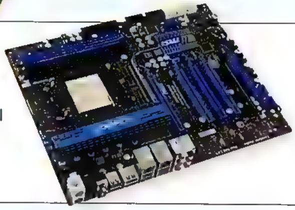
MOTHERBOARD

MSI 890FXA-GD70

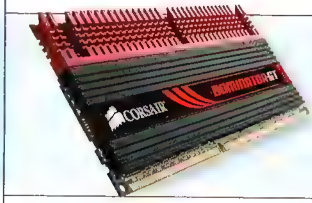
PRICE $265

A high-end AMD platform with full CrossFire support, great OC'er.

Issue 114, Page 38



MEMORY



Corsair Dominator GT CMG4GX3M2A2000C8

PRICE $400

Red-hot memory for dual-channel speed.

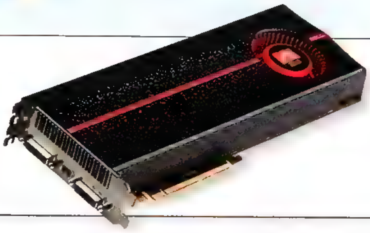
VIDEO CARD

ATI 5970

PRICE $830

A dual-cored DX11 beast, the most powerful yet.

Ref ID: 173167



For more builds check out the Kitlog E-mag at **atomicmpc.com.au/kitlog**

SUBTOTAL: $1690

Coolermaster Hyper 212 Plus
PRICE $50
Nice cooling for a very affordable price.

1TB HDD
PRICE $100
A thousand gigabyte storage drive on the cheap.

Viewsonic VX2233WM
PRICE $215
21.5 inches of value-packed screen, great buy.
Issue 108, Page 42

Plantronics Gamecom 777
PRICE $85
Solid set of cans with great audio.
Issue 101, Page 41

Onboard Realtek ALC889A
A decent chip that does the job.

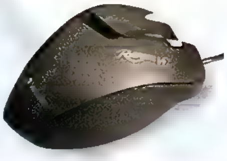
CASE

Lancool Dragonlord PC-K62
PRICE $165
Vibration dampened, great cooling and sexy looks.
Ref ID: 160151

KEYBOARD

Razer Arctosa
PRICE $50
A cool-looking keyboard that'll serve you very well.
Ref ID: 149483

MOUSE



Verbatim Rapier V1
PRICE $65
Great gaming performance and nifty features.
Issue 96, Page 43

POWER SUPPLY

OCZ ModXStream Pro 600W
PRICE $105
Plenty of wattage, reliable, modular for neatness.
Issue 109, Page 59

SUBTOTAL: $5308

Noctua NH-U12P SE2
PRICE $95
Two fans, quiet and nice overclocking capacity.
Issue 107, Page 48

Vertex LE 100GB & 500GB VelociRaptor
$530 + $400
st SSD with zippy storage.
, Page 43
, Page 46

Dell 2408WFP
PRICE $899
A huge 24in LCD screen for your prettiest pixels.
Issue 103, Page 57

500D
ood.

Auzentech X-Fi Prelude
PRICE $279
Best soundcard evar!
Ref ID: 112419

CASE

Coolermaster ATCS 840
PRICE $370
Heaps of fans, plenty of space, and dripping with quality.
Ref ID: 132479

KEYBOARD

Microsoft Sidewinder X6
PRICE $95
Backlit, sturdy, magnetic numpad & macro keys; what's not to like?
Ref ID: 129535

MOUSE

Microsoft Sidewinder X8 Wireless
PRICE $105
Cable-less, comfortable, lag-free and fraggable!
Ref ID: 148422

POWER SUPPLY

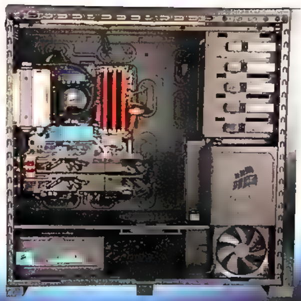
XFX 850W
PRICE $250
Plenty of power, ultra-stable rails and a great price.
Issue 107, Page 50

C

The **LAN Box**, the ultimate in portable gaming power – go anywhere, frag anyone. No longer will you be tied to a desk or forced to awkwardly manhandle your full-sized rig, helped by a convenient handle and beefy tech. Perfect for wowing people at LANs, the tech inside is fast enough to run any game, and boasts enough speed to keep your game running at full clip even if other programs intrude in the background. After all, no-one wants to miss a headshot.

Putting your system together when you've painstakingly chosen all the parts can be tough, so follow these quick tips:

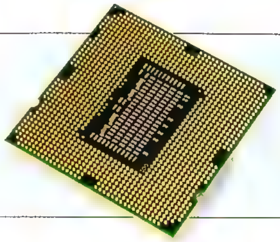
- Install HDDs, PSU and ODD before installing other tech
- Install the processor, motherboard, memory and heatsink before lowering into the case
- Organise your wiring as you build, plan ahead for future upgrades
- Work in a clean, brightly lit environment to avoid accidents



Finally, for the more entertainment-minded – and really, that's all of us – there's our **Home Theatre PC**, ready to play movies and music quietly and efficiently. It's got plenty of speed for video encoding while you're away, but makes very little noise thanks to the passive components used – even the heatsink can be dialed down to emit as much or as little noise as you want. Perfect for leaving next to the big-screen TV for all your media needs.

THE LAN BOX

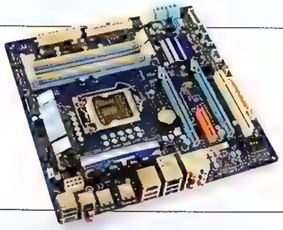
CPU



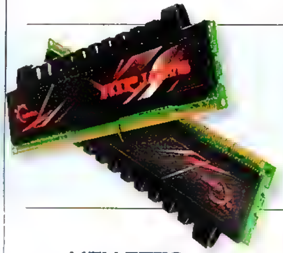
Intel Core i5 750
PRICE $240
Intel's budget quad is more than you'll need in a chip!
Issue 106, Page 36

MOTHERBOARD

GIGABYTE P55M-UD4
PRICE $195
Great overclockability, nice value.
Issue 107, Page 40



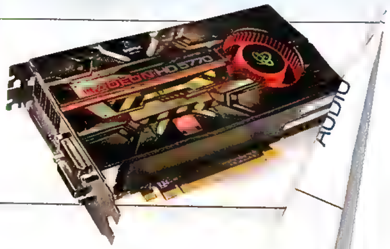
MEMORY



G.Skill Ripjaws 2000MHz
PRICE $190
Great value memory with amazing overclocking.
Issue 106, Page 52

VIDEO CARD

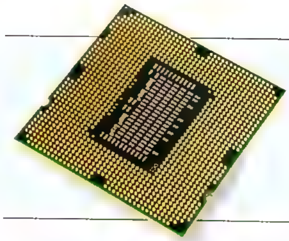
XFX 5770
PRICE $200
A decent value way to get into DX11.
Ref ID: 169775



AUDIO

THE HTPC

CPU



Intel Core i5 7
PRICE $240
Plenty of power
duties, video e
Issue 106, Pag

COOLER

MOTHERBOARD

GIGABYTE P55M-UD4
PRICE $195
mATX form factor doesn't skimp on storage, or speed.
Issue 107, Page 40

SYSTEM DRIVES

OCZ
WD 6
PRICE
Superfa
Issue 11
Issue 11

MEMORY

G.
PF
4

DISPLAY

VIDEO CARD

Gainward G210 512MB
PRICE $55
Perfect for Blu-Ray playback.

AUDIO

Logitech Z-5
PRICE $425
Earth-shakingly g
Ref ID: 22626

For more builds check out the Kitlog E-mag at **atomicmpc.com.au/kitlog**

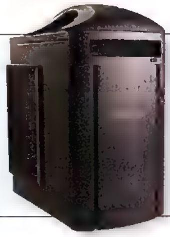
SUBTOTAL: $1634

COOLER

Intel Stock Cooler
PRICE FREE

Does the job, fits under PSU well.

CASE



Silverstone SG04
PRICE $170

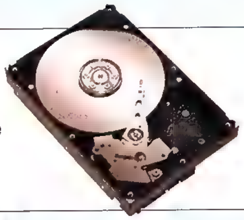
Small case with handle; add two 120mm fans for awesome cooling.

Ref ID: 148266

SYSTEMDRIVE

1TB HDD
PRICE $100

A thousand gigabyte storage drive on the cheap.



KEYBOARD

Razer Arctosa
PRICE $50

A cool-looking keyboard that'll serve you very well.

Ref ID: 149483

DISPLAY

Viewsonic VX2233WM
PRICE $199

21.5 inches of value-packed screen, great buy.

Issue 108, Page 42

MOUSE

Verbatim Rapier V1
PRICE $65

Great gaming performance and nifty features.

Issue 96, Page 43

AUDIO

Plantronics Gamecom 777
PRICE $85

Solid set of cans with great audio.

Issue 101, Page 41

Onboard Realtek ALC889A
A decent chip that does the job.

POWER SUPPLY

Corsair HX-520
PRICE $140

Modular, efficient and keeps size manageable in cramped case.

SUBTOTAL: $2337

COOLER

Scythe Big Shuriken
PRICE $79

Tiny 58mm height, quieter than a sponge.

CASE

SilverStone Grandia GD04
PRICE $145

Stylish exterior, 3x120mm filtered fans, 2x3.5" HDD space with plenty of room.

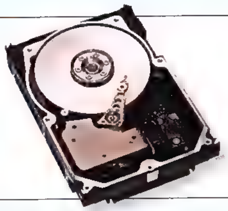
Issue 108, Page 47

SYSTEMDRIVE

Seagate Barracuda 1.5T
PRICE $139

Fast, voluminous storage for all your pr0n, videos and music.

Ref ID: 141622

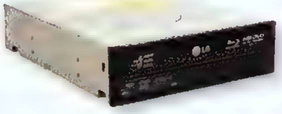


KEYBOARD

Logitech diNovo Edge
PRICE $199

Wireless board with a trackpad for mousing.

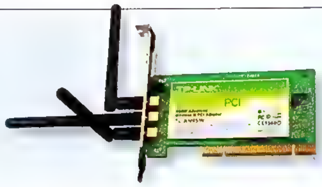
OPTICAL



LG GGC-H20L
PRICE $175

Bluray and HDDVD playback – best of both worlds

WIRELESS



TP-Link TL-WN951N
PRICE $55

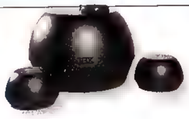
Zippy 802.11N for wireless HD video streaming.

AUDIO

Razer Mako 2.1 Speakers
PRICE $469

Stylish tub-thumpers.

Ref ID: 126695



ASUS Xonar HDAV 1.3
PRICE $270

Nice sound, expansion good.

Ref ID: 135112

POWER SUPPLY

Corsair HX-520
PRICE $140

Modular and above all quiet for this whisper-soft build.

SCORPION TECHNOLOGY COMPUTERS

VENOM GOLD

Intel Core i7 930 (2.80GHz)
GIGABYTE X58 Chipset
Kingston 6GB 1333MHz DDR3
2 x 1TB HDD, 850W PSU
Gigasbyte HD5850, 1GB, Blu-Ray
Fractal Designs Black Pearl Case

$1975

+ $80	Blu-Ray Burner
+ $150	HD 5870 1GB
+ $345	Core i7 960

VENOM SILVER

Intel Core i7 930 (2.80GHz)
GIGABYTE X58 Chipset
Kingston 3GB 1333MHz DDR3
1TB SATAIII HDD, 750W PSU
Asus HD 5770, 1GB, Blu-Ray
Fractal Designs Black Pearl Case

$1629

+ $70	6GB Memory
+ $190	HD5850 1GB
+ $300	HD5870 1GB

STINGE

Intel Core i7 980X Extreme Editic
6-Core, Overclocked @ 4.0+ GH
ASUS X58 Chipset
Corsair 6GB DDR3 (1600MHz)
Corsair 2x 64GB SSD + 1TB HD
2 x PowerColor HD5870 1GB
Blu-Ray, Corsair Obsidian Case
Corsair 1000W PSU, H50 Coole

$5049

+ $80	Blu-Ray Burner
+ $120	12GB 1600MHz

REDBACK GOLD

Intel Core i7 860 (2.80GHz)
GIGABYTE P55 Chipset
Corsair 4GB DDR3 (1333MHz)
1TB SATAIII HDD, 64MB
PowerColor HD 5750, 1GB
Antec Three Hundred, 750W

$1349

+ $45	HD 5770 1GB
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+ $214	8GB DDR3

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GIGABYTE P55 Chipset
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Antec Three Hundred, 550W

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+ $30	1.5TB HDD
+ $75	4GB Memory
+ $90	HD5770 1GB

MANTI HTPC

Intel Core i3 530
733MHz Graphics
GIGABYTE
H55 Chipset
2GB 1333MHz DDR3
1TB HDD, 32MB
8 Channel HD Audio

Dual Digital TV Tuner
Antec NSK2480B Case
Windows 7 Home Premium
MCE Remote Included

$939

HORNET GOLD

Intel Core i5 661 (3.33GHz)
GIGABYTE H55 Chipset
Kingston 4GB 133MHz DDR3
500GB HDD, 2 Ch. Speakers
Intel 900MHz Graphics, HDMI
CM Centurion 5 II, 500W PSU

$815

+ $30	1TB HDD, 64MB
+ $80	Blu-Ray Reader
+ $120	GeForce GT 240

HORNET SILVER

Intel Core i3 530 (2.93GHz)
GIGABYTE H55 Chipset
Kingston 2GB 1333MHz DDR3
500GB HDD, 2 Ch. Speakers
Intel 733MHz Graphics, HDMI
CM Centurion 5 II, 500W PSU

$649

+ $30	1TB HDD, 64MB
+ $40	Core i3 550
+ $75	4GB Memory

BEETLE

Pentium Dual E5400 (2.70GHz)
ASUS G41 Chipset
Kingston 2GB 1333MHz DDR3
500GB HDD, 2 Ch. Speakers
Intel X4500 Onboard Graphics
Aywun Black Case, 420W PSU

$415

+ $25	1TB HDD, 64MB
+ $69	Core 2 Duo E7500
+ $80	4GB Memory

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TECHNOLOGY

The daily grind

Daniel Rutter knows the value of time.

Grinding existed before computer games. But games made it worse.

Doing something monotonous over and over again to increase your skills is, in the real world, called "rote learning". Don Bradman bouncing that golf ball off a wall with a stump for a bat was the very soul of grinding. Except that he ended up really good at a culturally important real-world game, while computer-game grinders just end up with a more powerful character in a game that even *they* may not remember a few years later.

It's this ephemeral pointlessness that makes people hate grinding in games. If you have to do something tedious to make something in the real world (even if that something is only money), then it may be tiresome, but it does at least have a worthwhile purpose, like feeding your family.

It turns out that you can get people to work for free on online projects, too – especially if you figure out a way to make a game of it.

Grinding XP in a game, in contrast, may make you quite cross with yourself when you're lying on your deathbed.

And then there's the other kind of grinding, in which you find yourself strangely compelled to continue some repetitive act which may gain you in-game cash or XP or something, but which has a mesmeric grip unjustified by the actual reward.

(Oh, and we all also know it was soothing to spend half an hour jogging around outside CJ's house in *San Andreas* chainsawing your homies for cash. But you should probably keep that under your hat, in case a politician finds out.)

The very worst grinding is the kind that you have to do to get to the next interesting thing in the game, and which is artificially prolonged by infuriating game design. (It has been observed - **bit.ly/wowpeeves** - that the number of bears you should have to kill to get three bear-claws for a quest-giving NPC is one, not *thirty*.)

Fortunately, though, the compulsive power of the grind can also be used for good.

In the non-profit world, everyone knows that even if it's legal to pay workers, let's say, one dollar an hour, that's a terrible idea. Any un-incarcerated adult citizen of the developed world will be insulted by so low a wage.

But lots of people are, if their finances permit it, perfectly happy to work *for free*, for a worthy cause.

It turns out that you can get people to work for free on online projects, too - especially if you figure out a way to make a game of it. (Whereupon players can be rewarded with nothing but good old "points", which I'm told are quite inexpensive to make.)

A few years ago, Carnegie Mellon professor Luis von Ahn invented the "ESP Game" (**bit.ly/espgame**). The ESP Game site sends two players the same image to look at, and then the players try to type words that match a word the other player's typed. The ESP Game gives you a point for every hit, which by itself makes it a perfect grind activity - but the matching words are actually used to tag the images with metadata about their contents, a task which computers can't yet do.

The ESP Game was quickly adapted into "Google Image Labeler"; von Ahn has some similar offerings at gwap.com ("Games With A Purpose"). They've expanded the concept into defining words, tagging music and video, and identifying objects in images.

There are many tasks like this on Amazon's "Mechanical Turk" (**mturk.com**), as well. People who put jobs on The Turk actually pay for contributions, though generally so little that it goes beyond insulting and enters the realm of the ridiculous.

Many tasks, like for instance writing software, can't be cut into game-like easy pieces. But distributed "human computation" is still a powerful tool.

All we need now is a way to test cancer drugs by shooting orcs.

Give 'em time.

Dan Rutter will complete
thirty more columns to level up.
dan@atomicmpc.com.au

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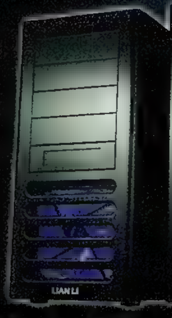
PC-8N
Bay: 5.25" x 4, 3.5" x 1, 3.5" internal x 3
2.5" internal x 1
M/B: ATX, M-ATX
Fan: 2 x 120mm
Dim. 210 x 450 x 490 (W, H, D)

PC-7FN / PC-7FNWB
Bay: 5.25" x 5, 3.5" x 1(use one 5.25" to 3.5"converter) ,3.5"(2.5") internal x 4
M/B: ATX, M-ATX
Fan: 1 x 120mm, 1 x 140mm
Dim. 210 x 470 x 490 (W, H, D)
Color: black / silver

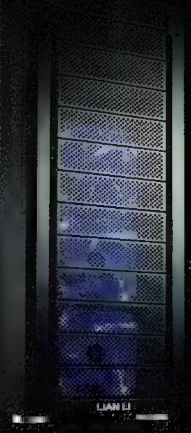
PC-60FN / PC-60FNWB
Bay: 5.25" x 5, 3.5" x 1(use one 5.25" to 3.5"converter) ,3.5"(2.5") internal x 4
M/B: ATX, M-ATX
Fan: 1 x 120mm, 1 x 140mm
Dim. 210 x 470 x 490 (W, H, D)
Color: black / silver



PC-7FN / PC-7FNWB

PC-60FN / PC-60FNWB

PC-X900B
Bay: 5.25" x 3, 3.5" x 1(use one 5.25" to 3.5"converter) ,3.5" internal x 7
M/B: ATX, M-ATX
Fan: 5 x 120mm
I/O: USB3.0 x 4, E-SATA, HD Audio
Color: red / black / silver



PC-A77FB
Bay: 5.25" x 12,
3.5" internal x 9 (use 5.25" x 9bays)
M/B: E-ATX / ATX / M-ATX / CEB
Fan: 4 x 120mm, 2 x 140mm
I/O: USB3.0 x 4, E-SATA, HD Audio
Color: red / black / silver

PC-V352B
Bay: 5.25" x 2, 3.5" x 1,
3.5" internal x3
M/B: M-ATX, Mini ITX
Fan: 2 x 120mm, 1 x 80mm
I/O: USB3.0 x 2, E-SATA, HD Audio
Color: red / black / silver

PC-Q08
Bay: 5.25" x1, 3.5"internal x6
2.5" x 1
M/B: Mini ITX
Fan: 1 x 120mm, 1 x 140mm
I/O: USB3.0 x2, HD Audio
Color: red / black / silver

PITSTOP T60 / T1

Test Bench

DIY

T60
Bay: 5.25" x 2, 3.5" x 3, 2.5" x 2
M/B: ATX / M-ATX
PCI: 8 slots
Size: 351 x 330 x 400mm
Color: red / black / silver
Optional: USB3.0 x2, E-SATA, HD Audio

T1
2010 SPECIAL EDITION
Bay: Slim ODD x1, 3.5" internal x1
M/B: Mini ITX
Dim.: 520 x 300 x 485mm
Color: red / black / silver

Lancool

DRAGONLORD

NEW GENERATION PC CASE

Superb Thermal & Silent Performance, Patented Tool-less/Anti-vibration Features
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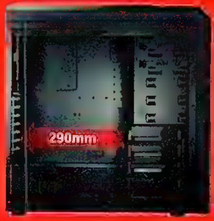

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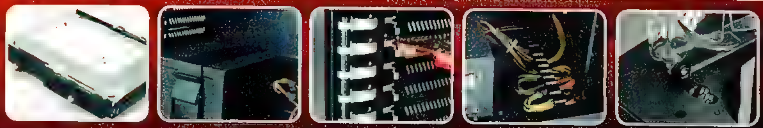
PC-K60/PC-K58

PC-K56



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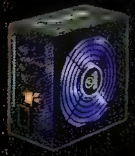

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TUTORIAL

HANDS-ON TUTORIALS FOR THE TECHNICALLY MINDED

Growing up on a steady diet of TV cop shows and big-budget action movies pretty much ensures that at some point you will stop and consider a career in law enforcement.

In most cases, the answer is a resounding 'hell no', with some badass muttering about how you work outside the law, man. But you can't deny that those forensic tech dudes seem to have a pretty cool time: sitting in darkened rooms, lit only by the glow of the computer screen, hacking into supercrime mainframes, pretending to be teenage girls on IM (for crook-catching purposes, obviously), and of course, dazzling cops with amazing and improbable maginfy-and-sharpen photoshop skills, all without missing a single opportunity for a wisecrack.

For those of you who haven't let go of the dream, Chris Taylor has gone deep undercover (no, really) to find out how you can take your tech skills beyond the thin blue line ...

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Chris Taylor looks at how to put your tech skills to work in the world of law enforcement.

atomic MAXIMUM POWER COMPUTING WEEKLY NEWSLETTER

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Issue 3, March 2010
atomic
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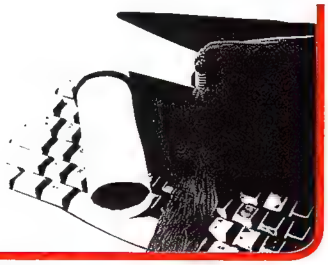


Chris Taylor takes your tech skills into the world of law enforcement.

With the way the mass media covers 'cyber crime', you could be forgiven for thinking that law enforcement agencies are beating down the doors of TAFEs and universities in search of the best and brightest IT graduates. While some law enforcement agencies have graduate-entry programs or partnerships with higher education institutes such as Western Australia's Edith Cowan University and New South Wales' University of Western Sydney and Charles Sturt University, getting a job with the five-oh as a tech specialist isn't that simple. Still, law enforcement – at a state or federal level – is a viable career, whether you consider yourself natural poh-leece or are simply in search of a job with room for progression and a uniform that will help you score.

First things first: we fired off emails to every state and territory police department and were told, by and large, the same thing. They don't hire tech specialists as such. There are jobs within the police force that will require technical skills, but there is not much they can't have you trained up in. Senior Sergeant Ken Walker from Western Australia Police said, "Our main focus is on recruiting candidates who will progress through the Police Academy into frontline policing. These candidates reflect the diversity of the community itself from age, gender, culture and religious and ethnic perspectives. They have a wide variety of previous experience in the workforce from plumbers and carpenters to accountants and surveyors or they may have previously been a student or served with the Australian Defence Force."

A tertiary qualification, of course, never hurts. The Victoria Police website specifically says that a degree makes you an attractive candidate for recruitment (assuming everything else about your application looks good).

Western Australia Police has a partnership with Edith Cowan University. "Candidates who have undertaken three semesters of study at Edith Cowan University and who successfully complete entrance assessments for the WA Police will receive an Associate Degree in Criminology and Justice at the completion of their six month Academy training," said Walker. If you're considering working for your state or territory's police force after graduating from TAFE or university, it would be worthwhile contacting them in advance to see if something similar is available to you.

While state police forces aren't specifically hiring technology specialists, federal law enforcement agencies – the Australian Federal Police, the Australian Crime Commission, the Australian Securities and Investments Commission, and the Australian Customs and Border Protection Service – are.

The latter has a graduate entry program available to just about any sensible soul with an undergraduate degree, but they do mention that they're specifically interested in information technology graduates. Their process is involved: you need to apply by a specific date, undergo psychometric testing on a specific date and commence training at a specific date. You also need to be prepared to move to Canberra, as many of their postings are in our porn and firecracker capital. That said, there's a small chance you might one day appear on an episode of Border Security, attempting to convince people who've suddenly and conveniently forgotten how to speak English that bringing pickled starfish snacks into the country is illegal. The agency's website (**www.customs.gov.au**) has more information about the recruitment process.

The Australian Federal Police also have a graduate entry program and an interest in information technology. Again, the process is involved: you can't just apply whenever you feel like it, you need to work to their schedule. The Graduate Program sees you paired with a mentor and subjected to twelve months of comprehensive training. Incidentally, applications for the 2011 Graduate Program will be opening just as this magazine lands in newsagencies and mailboxes. More information about the Graduate Program and general recruitment can be found on their website (**www.afp.gov.au/jobs**).

John Lawler, CEO of the Australian Crime Commission, told us, "The Australian Crime Commission can offer a variety of challenging jobs for IT and information exploitation specialists. Roles range from mainstream ICT support functions through to computer forensics and data mining. Specialists capable of analysing data and information to assist in identifying those involved in serious and organised crime are in constant demand and the Australian Crime Commission's success in this area is increasing the need for talented technical staff."

"The need to tackle technology-based crime in the twenty-first century has led to the development of computer forensics analysts known as Digital Evidence Specialists (DES). The DES enables law enforcement authorities and agencies to extract, analyse and present computer-based evidence in a forensically sound manner. DES can retrieve vital evidence, including communications, financial records and internet activities, from computers and digital devices. The DES then presents this evidence to the court as an expert witness," said Lawler.

"Given the investigative role of the Australian Crime Commission," he continued, "there is a requirement for a broad range of skills and experience around information technology. Professionals with data acquisition and analysis skills, people with software development skills and experience and those with computer-based research skills (PhD students, for example) are also highly sought after. The type of work that the Australian Crime Commission does requires them to be able to combine their technical expertise with a range of disciplines including accounting or auditing, chemistry and a range of engineering qualifications such as information systems design."

The Australian Securities and Investment also recruits information technology graduates. Jobs are advertised on their website (**http://www.asic.gov.au/asic/ASIC.NSF/byHeadline/Careers+at+ASIC**). They also offer a graduate-entry program, although applications for 2011 are already closed. Applications for 2012 open in March next year.

What you can expect from a career in law enforcement varies from agency to agency and job to job. "The DES forms a vital part of police operations," said Lawler, "much the same as fingerprint or crime scene experts. The work varies from long-term complex fraud investigations to drug investigations and online child exploitation. The DES should be systematic and thorough, but by the same token enjoy problem solving involving technical hurdles and other difficulties."

He continued, "Other specialists can expect to tackle tasks such as forensic accounting, auditing, criminal network analysis, information system development and data mining."

"The Australian Crime Commission also advises the government on the development of policy and legislation to tackle cyber crime or to counter the use of complex technologies to enable criminal activities," he said.

Roles with the Australian Federal Police are varied. An Australian Federal Police spokesperson said, "You can build your career at the local, national or international level with non-policing roles ranging from intelligence analysts and forensic investigators through to jobs in information technology, legal, training, marketing and communications and administrative support." Descriptions of specific roles are available on the careers page of their website.

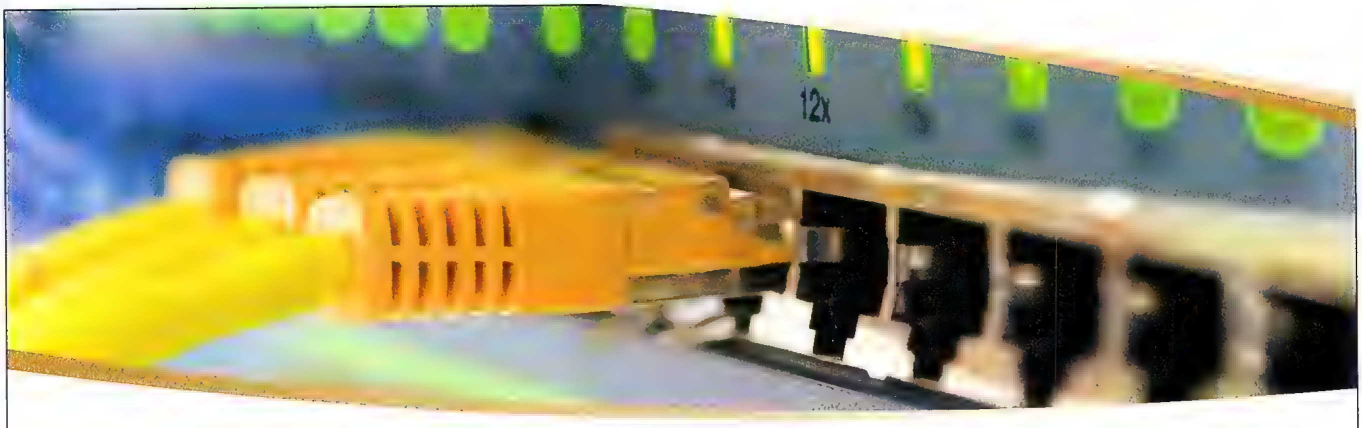
At a state and territory level, a tertiary qualification isn't necessary. If you're fresh out of school, TAFE or have an irrelevant university degree, a career as an information technology specialist is still a possibility. As a general rule you'll need to be an Australian citizen with a driver's licence who can demonstrate a reasonable level of physical and psychological competency. Similar opportunities are available with some federal law enforcement authorities.

That said, the federal law enforcement authorities are on the lookout for specialists. "Ideally ICT staff interested in employment with the Australian Crime Commission would need to have appropriate tertiary qualifications and a track record of achieving results," said Lawler. "They must be comfortable with today's technology and want to influence technology use in the future. The work of technical and other staff in the Australian Crime Commission is not only interesting and challenging, it is meaningful."

"The Australian Federal Police seeks to recruit graduates from a wide range of disciplines, not limited to law, justice and criminology studies," said an Australian Federal Police spokesperson. "Tertiary qualifications are desirable but for some specialists roles may be mandatory. Tertiary qualifications may also add to your competitiveness."

Lawler said, "Background qualifications in computer hardware and software are an advantage and in many cases a prerequisite. Most Australian universities now offer graduate or post-graduate studies in Digital Forensics Techniques."

"The Australian Crime Commission looks for proven research skills, legal qualifications in both domestic and international law, investigative experience either from a police or intelligence background, forensic science experience as well as experience from the world of commerce and banking," said Lawler. "We are looking for people who are able to marry their academic or work experience with their IT abilities to be of most use in areas of investigation undertaken by the Australian Crime Commission."



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GAMEPLAY

GAMES, GAMING AND FILM COVERED... ATOMIC-STYLE

We went to E3 this month, and while there were plenty of lousy t-shirts to grab, we decided to bring you back eight pages of gaming awesomeness instead.

Rather than just give you the standard play-by-play review of the show, we've focussed on what matters most to all Atomicans: the boothba- er, the games, with a round-up of the best in show in each major gaming category. This is the stuff you're going to be wasting all your spare time on over the next year, we promise.

One of the highlights of E3 was Kaos Studios' near-future first-person-shooter Homefront, and it just happens to be our Engine Room for this month. Seamus Byrne checks out what happens when North Korea occupies the US and the little people have to fight back - and it looks like all sorts of fun.

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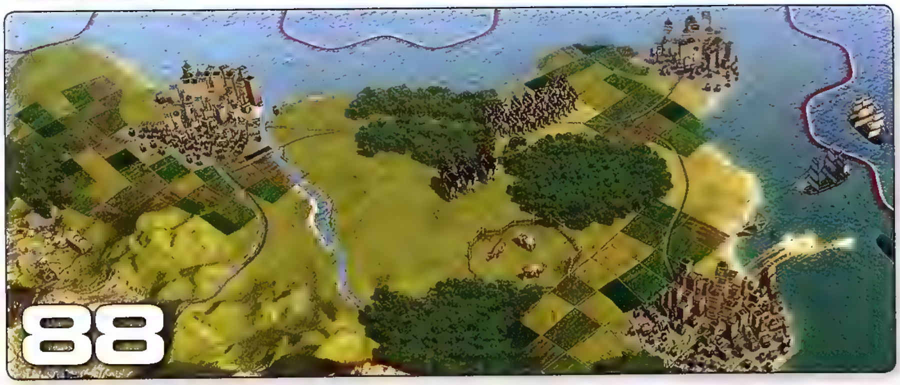

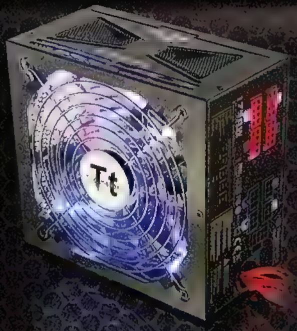

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HOMEFRONT

A North Korean occupation of the USA? WTF? Comrade **Seamus Byrne** investigates.

Last month we looked at a 2027 where the world was preparing for a transhuman revolution. This month it's a 2027 where North Korea has grown to become a South-East Asian powerhouse that tackles the USA head on... and wins. Homefront is no 'fight to hold back an invading force on US soil'. Homefront is a game where North Korea has already successfully occupied North America, and your story begins with an effort as an American insurgent trying to claw back some of your homeland.

Homefront comes from developer Kaos Studios, formerly known as Trauma Studios, straight out of New York City. Their pedigree for quality shooters is top notch, having delivered the popular Desert Combat mod for the original Battlefield 1942 and then going on to create Frontlines: Fuel of War for its new corporate masters, THQ.

Much more than a Frontlines sequel

Pedigree aside, on our visit to New York City Kaos studios was eager to promote its latest project as much more than some kind of simple evolution of Frontlines. Homefront is likely to arrive in the first half of 2011, three years after Frontlines hit the scene, and in that time Kaos feels it's brought a lot more to the table.

The big revolution in the development of Homefront has been the involvement of a Hollywood legend, John Milius, to give the story behind the game a lot more power. Milius didn't just have a hand in the screenplays of classics such as Apocalypse Now, Dirty Harry, and Conan the Barbarian; he actually wrote the all-time classic line "I love the smell of napalm in the morning," amongst others. And most importantly in the context of Homefront, he was the writer and director of *Red Dawn*, that classic '80s film where the Russians invade and occupy American soil and a group of high school kids, the Wolverines, step up as guerrilla fighters.

You won't be playing a high school kid, and your guerrillas won't be calling themselves the Wolverines (though we did see concept art of a high school turned internment camp with a nice 'Go Wolverines' homage), but the general story concept allows a talent like Milius to bring some real substance to what in FPS games is so often a wafer-thin layer of shallow story.

A small, human story

There's a real point of difference in the way this story is set to unfold. We've mentioned guerrilla fighters already, but in this game that isn't meant in some military sense of the term. Homefront is not at all based around some team of über warriors armed to the teeth taking on an overwhelmingly strong occupying force, like you might find in umpteen other shooters. You're just a civilian trying to make a difference.

"It's not about saving the entire country," says David Votypka, Design Director at Kaos Studios. "It's really a small story about this small resistance squad."

Danny Bilson, Executive Vice President of

Core Games, THQ, adds a little more detail to the story of the game.

"The objective is: move some fuel from Colorado to San Francisco to fuel up some National Guard stuff that they've recovered to try to take back the Golden Gate Bridge. It's not military ra-ra. It's 'what would it be like just for people and civilians?' Our game has lots of civilians in it. We're trying to have consequences to violence."

"This is something John Milius brought to us," says Votypka. "To keep it a small, human story. That's really the goal in the campaign, and what's really great about doing a game like this in a setting like this is that the resistance makes mistakes. In the demo you see a misfire. It's like, shit! We just burned some of our own guys! Things don't always go to plan. And in a lot of shooters based around the military you don't often get those twists and turns."

The campaign is a linear story, with a series of encounters where you will be pushed to the limit against an enemy with better numbers and tools than yours. And that means you're going to need to play dirty.

"One of the things Milius said to us when he came on was that the resistance has to be absolutely ruthless. They can't be politically correct. They can't be second guessing what they're doing all the time. So the phosphorus you see in the demo is pretty nasty stuff. It's against the Geneva Convention."

In the key action sequence we saw in our demo, the resistance squad is attempting to take a big hardware store (think Bunnings) to capture much needed supplies. But it's heavily guarded by the Korean forces.

"We knew we wanted to do a raid on a big box store. But we wanted to figure out what the tactics would be," says Votypka. "So we talked to John about it and he said it's got to be

"It's 'what would it be like just for people and civilians?' Our game has lots of civilians in it. We're trying to have consequences to violence."

very guerrilla. They're going to be outnumbered, they can't come in there guns blazing and take down everybody with no problem. You have to do something that gives them sort of a leg up and evens the odds. And that's where the phosphorus idea came from. It's a brutal weapon and it matches the resistance's 'whatever it takes' attitude.

As this raid suggests, the game puts you on the wrong side of controlling important resources. You will be able to pick up enemy hardware along the way, but there will always be a sense of scrounging for necessities as you progress.

"We want it to feel a lot like you are the resistance, and you are under resourced quite a bit," says Votypka. "You'll be taking advantage of enemy weapon drops and stashes and that type of thing. The resistance will also be using older weapons while the military will be using some of the newer stuff. In this dystopian future where things have crumbled a little bit, all sorts of resources are scarce."

The hardware of 2027

On the technical side, Brian Burrell, Lead Skeletal Asset Artist for Kaos Studios, points out they've worked hard to get this sense of scarcity into the weapons you'll find in the game.

"We can't just say 'let's make 50 weapons'. You've got to balance it all out," says Burrell. "We need to be very careful about what we put in. We think about what a resistance fighter in this particular world could find. Maybe grandpa's old shotgun, so they'll use that. The main weapon used in the single player is the Type 3 AK."

Thankfully it won't all be old school guns. We're still talking about 17 years in the future, and with Kaos Studios pedigree you can expect to enjoy working with some land and air drones.

In our demo, the assault on the hardware store was assisted by a chunky land drone friend, the Goliath. There was a tactical play to contend with, as an enemy EMP was being fired on us to keep the goliath out of action. So we had to focus on taking out the EMP shooter to then get our main weapon back in the game and taking out major enemy combatants — like a gunship that turned up part way through the battle.

> "We think about what a resistance fighter in this particular world could find. Maybe grandpa's old shotgun, so they'll use that."

"You can think of it as kind of your sidekick in single player," says Votypka. "You captured it from a military base that had been abandoned or undergone combat in the initial invasion. It is an autonomous vehicle, so it can act on its own but you can still control its rockets."

There's also still a few ideas up in the air for consideration about how the drones may operate when the game goes gold.

"We're debating whether the drone weapons will be modifiable," says Burrell. "What would it be like to have a sniper type drone? Currently they are designed in a modular fashion so we can attach different weapons. We just need to figure out where we draw the line, and ask ourselves how does that make the game better?"

For larger hardware that we'll mostly be seeing in the multiplayer game, like Abrams tanks, Kaos has gone into serious detail to add more strategic depth to large arms combat. Key to this is a location-based armour system.

"If you start taking damage on one side of your

tank you can get finished off a lot faster if you get attacked there again," says Burrell. "Or if you shoot the back of a tank you're going to kill it a lot faster. So it's basically introducing more strategy. Visuals are going to show you what's going on, but it's really a strategic element for how quickly you can take someone down, or how you can defend yourself from being taken down too quickly."

An Engine with a sense of Drama

For the most part, Homefront is built on a standard Unreal Engine codebase. Despite prodding for technicals like only a representative of Atomic would, the team has been fairly subtle in their modification of the core engine.

"Our adjustments to Unreal Engine have been geared toward making the terrain system better," says Jason Priest, Lead Environment Artist. "So we can do more materials on the terrain. We can do roads on the terrain that are semi-procedurally generated. Those are the things we wanted to focus on. And also ways of rapidly iterating in packages."

But then there is one layer of tech Kaos has added to the mix specifically to enhance your sense of immersion: The Drama Engine.

"The 'Drama Engine', as we like to call it, is the umbrella for a lot of tools and techniques that we use in the game to create these dramatic moments," says Votypka. "In the demo you saw there's the car flip, the knockdown, the tower fall. That tower fall is probably the most complicated mo-cap scene, or one of them, that we do in the game."

With all these moments, there is a real sense that your character is at the heart of what is going on. Everything comes close to you, events fly around you and there is an ongoing sense that you are just seconds from death at any given moment.

"There's a lot of different triggers that we use that fall under that term, but what we really want this game to be is dramatic and cinematic."

Kaos cares about your PC

Kaos has serious respect for the desktop as a gaming platform, having evolved from the makers of the classic Desert Combat Battlefield mod to the AAA studio they are today.

On Homefront, Kaos isn't just putting a little extra care into how they port the console version... they're building the PC version almost entirely from scratch.

"We have an entire dedicated team for the PC. It's not going to be just another console port," says Votypka. "It's a dedicated PC product."

We asked about the availability of mod tools for PC gamers, and while he couldn't say anything specific, Votypka hinted that they are "hoping to do that".

"We haven't confirmed anything, but it's where our roots come from so we really want to support those guys," says Votypka. "The PC experience is an important one for us. We are putting in specific features that aren't going to be on the console versions. Once we start talking about multiplayer [later in the year] we'll be able to talk more about PC."

"I just want a game that people love, and then it takes care of itself."

Multiplayer tackles the big fight

Officially, no announcements will be made around the Homefront multiplayer experience until later this year — probably timed to coincide with the Gamescom event in Germany in late August. But having had the ear of a few insiders, and been taken on a tour of the New York studio, we've managed to glean a few small details to whet the appetite.

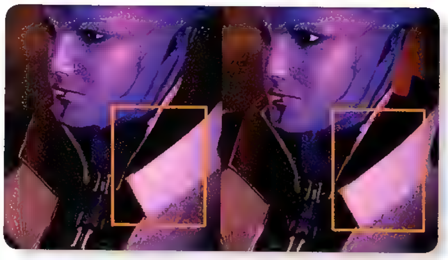
"Multiplayer is large scale warfare, so it's military versus military," says Votypka. "You can think of it as the skirmishes that happen during the initial occupation. So all the different maps are around various locations in the US where forces met up, or were fighting over."

As for classes, we spied some concept drawings pointing to Assault, SMG, Heavy, and Sniper classes, so you could expect at least these classes in the multiplayer offering. These have direct pedigree to the Frontlines class line up (SMG being the Special Ops class), with anti-vehicle and close combat classes the only absentees.

Frontlines earned some good reviews as a multiplayer shooter, but was let down by a buggy experience and a slow feature rollout. With all they've learned from that situation, as well as adding talent from the team behind Medal of Honor, Kaos looks serious about making this a powerhouse online experience.

MODIFICATION

with Ashton 'For the love of Mod' Mills



Texmod

Game Mass Effect 2
URL social.bioware.com/project/2015

Modding games requires at the very least one essential ingredient: tools. Often, the tools are provided by the developer to allow people to make their own content. When the tools aren't provided, modding is impossible.

Usually. Sometimes, dedicated programmers can reverse engineer file formats and provide some basic functionality with which to alter a game (even games that do have tools can still see third-party programs made to enhance or complement them, as we've seen with Fallout 3).

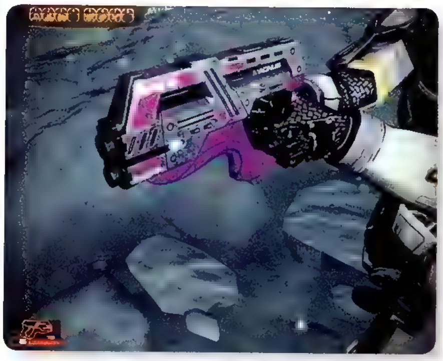
That's where *Texmod* comes in. On its own it doesn't alter your game – but paired with new textures, can insert them to replace those shipped with the game on the fly, without touching the original files. While it can be used with a variety of games, and as Mass Effect 2 (and Mass Effect before it) doesn't come with modding tools, it's gained popularity with the Mass Effect community.

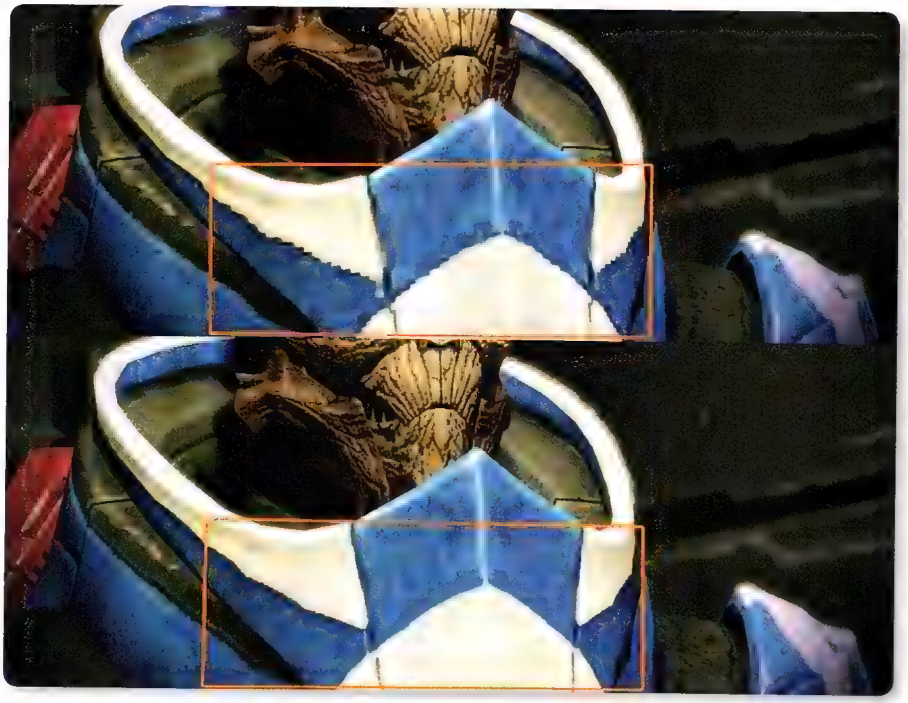
For Bioware's latest there are already a range of texture mods available, though the use of *Texmod* – which can be finicky – means the modding community isn't quite as vibrant as it could have been with proper official tools. Never the less, there are some useful mods you can use to enhance your Mass Effect 2 experience.

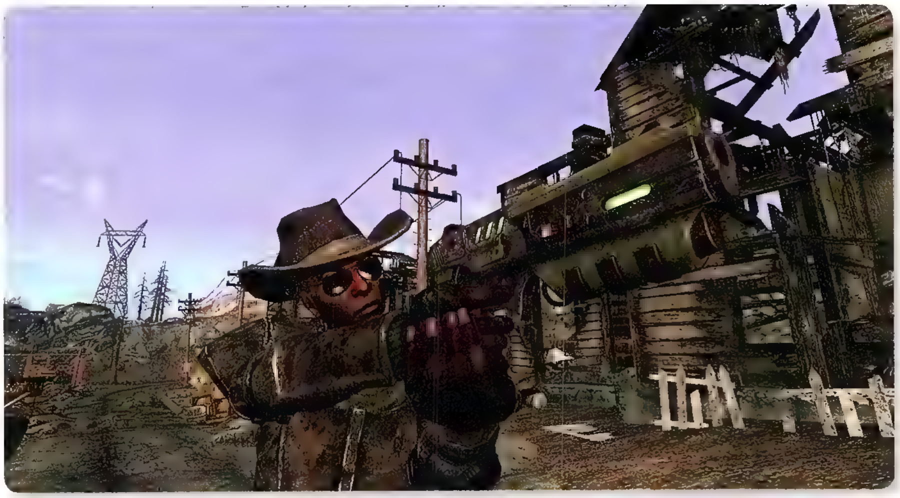
Head to **social.bioware.com**, search for 'ME2' and 'Effect' separately for Category 'Builder - DA Textures' (yes, ME2 mods have to be placed in Dragon Age's modding community ***facepalm Bioware***). You can also search other categories for ME2 mods.

One you should certainly check out is *Mass Effect 2 Texture Improvements* (**social.bioware.com/project/2070**) which aims to fix many of the poorer textures in the game. You can also find a project to improve normal maps for better detail (**social.bioware.com/project/2616**) and, if you want to express your feminine side, the flashy *Gunz for Girlz* (**social.bioware.com/project/2185**) – because deep down inside, you know you've always wanted pink guns.

Take a look around at the various texture mods, but grab *Texmod* first, as they all require it.







Fallout Wanderers Edition

Game Fallout 3
URL www.fallout3nexus.com/downloads/file.php?id=2761

Fallout. Fallout never changes....no, scratch that, it does – thanks to mods! In fact, some mods promise to almost completely revamp the game from top to bottom – and *Fallout Wanderers Edition* is one such mod.

Initially designed to improve immersion with a more survivalist experience through tweaking in-game variables, it has rapidly grown to incorporate new weapons and armours, improved NPC AI, expanded and improved companion control, an overhaul of the drug system, a re-design of power-armour and night-vision effects, and the integration of other popular mods like *Primary Needs* for hunger and thirst and *Explosive Entry* for breaking locks and doors with (as you can guess) explosives.

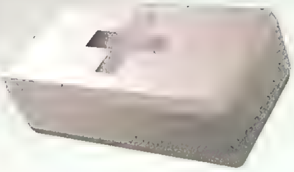
As a result the Wasteland becomes a much more dangerous place, where you have to think about the weapons you use, how much ammo you have, and take on fights more strategically. Head shots can actually kill quickly – as they should – so it's easier to take down some enemies, but makes you more vulnerable too. In addition to VATS, action points can also be spent on a new 'Bullet Time', bringing a Matrix feel – but also highly useful combat tool – to the game.

While FWE does include new weapons and armour, it doesn't do it near the scale of *Fallout Overhaul Kit* (FOOK). And, unfortunately, the two are not compatible due to both making extensive gameplay changes across the board. It is, however, highly compatible with *Mart's Mutant Mod* (by yours truly) and the lead designer of FWE began the mod keeping compatibility with MMM in mind.

With the release of Fallout: New Vegas around the corner, if you're picking up the game again or only just playing it for the first time, definitely check out FWE – and be prepared for a tougher, but much more immersive and rewarding, venture into the Wasteland.

PATCH notes

The month's essential patches.



Mass Effect 2 v1.02 Patch

ArmA 2: Operation Arrowhead Patch v1.50 to v1.52

World of Warcraft Patch v3.3.5 to v3.3.5a

Risen Patch v1.10

Football Manager 09 Patch v9.3.0

Conspiracies: Rising Dead 2 Mod Patch v1.05 for ArmA 2

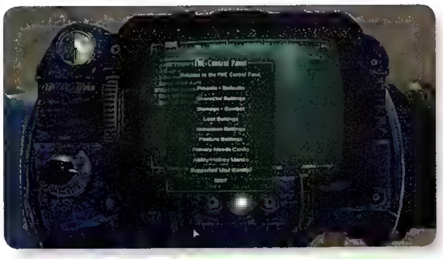
Grand Theft Auto 4 Patch v1.0.7.0

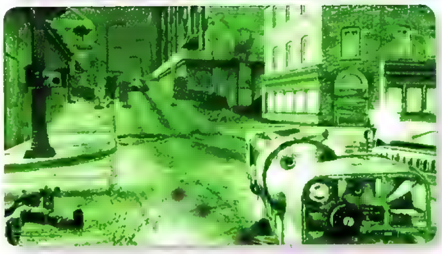
Combat Arms Patch v41

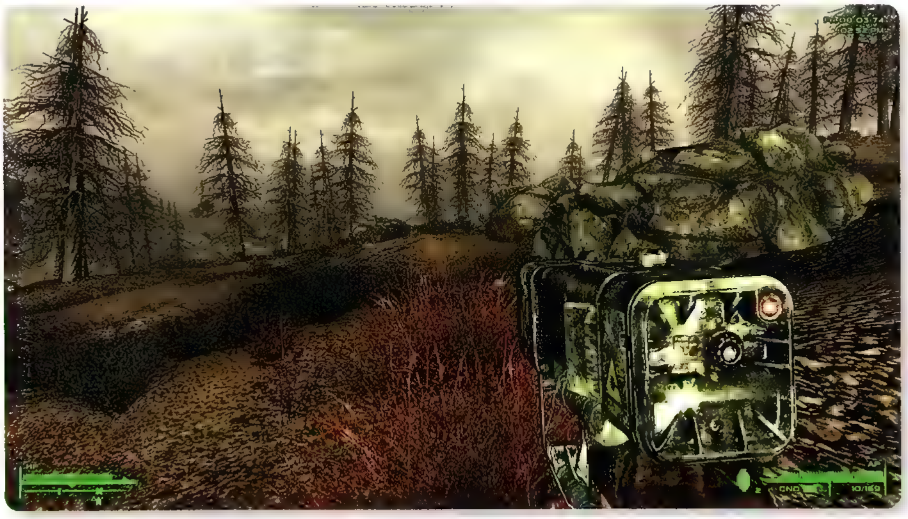
BioShock 2 Patch v1.0.0.3

Splinter Cell: Conviction Patch v1.03

Company of Heroes: Opposing Fronts Patch v2.1.0.0 to v2.1.0.3







BEST IN SHOW

There were literally too many games to cover at this year's E3, but we've put on our thinking caps to work out the best in breed of this year's show... **David Hollingworth** picks the games to watch!

E3 over the years has gone through a number of facelifts. Once, it was the ultimate expression of gaming glitz, showing off the exuberance of the gaming industry for all to see. Then, recently, it became a more dour trade show, trimming back on the excess to try and show the world that gaming is now serious business. Even more recently, it's started to swing back to those over-the-top times full of glamour, boothbabes, and enough bright lights and noise to drown out Sydney's Mardi Gras.

This year's E3 definitely swung toward the latter, and while it's certainly not the show it used to be, it's still arguably the greatest gaming show on earth.

The crop of games on display this year, seemed to leave a lot of show-goers feeling, if not cold, then certainly not as excited as other years. So many of the big hits of the show are continuations of existing series that the show may as well be called SequelCon 2: The Againining. Of all the games we saw, there's literally only a handful that are original IPs.

This is not to say that the sequels, reboots and reimaginings on offer aren't good looking games, but it really is hard to get too excited over stuff that – to be brutally honest – we've all seen before.

But it would be remiss of us to leave things at a big bah-humbug and ignore the show. So, come along for the first ever outing of the Atomic Game Fancier's Association, and our Best of Show Parade!

E3
BEST IN SHOW
LUMBER LIQUIDATORS

Best First Person Shooter

A range of futuristic shooters battled for our attention at E3, alongside some gritty modern day efforts. But which one takes the ribbon?

Contenders

Ghost Recon: Future Soldier, Rage, Medal of Honor, Crysis 2, Xcom, Goldeneye for Wii, Call of Duty: Black Ops, Homefront, Red Faction: Armageddon, Bulletstorm.

Rage

The First Person Shooter is perhaps the most iconic of games, especially when it comes to PC. Console FPS games have made massive inroads over the last decade, but in the minds of the hardcore, the genre's home is on the PC.

Which is why a show like E3, especially this year, is so sad – almost no developers were willing to talk about the PC versions of their games. Pretty much every game we saw was on console. Poo.

But at least it makes the matter of comparing pretty easy – or, at least, not as complex as it could be. It's an even playing ground to judge the best FPS we saw at the show.

Honorable mentions

To be perfectly honest, there wasn't a single FPS we saw that really leapt out and grabbed us. The vast majority of them are from well-worn franchises and very few of them offer any new style of innovative gameplay.

That said, there's some games that stood out. *Ghost Recon: Future Soldier's* take on near future warfare is looking like an involving mix of sci-fi hardware and real-world research and development. Ubisoft consulted with inventors and military contractors to make sure that they included nothing which isn't already being researched or worked on. And that shows in the game's cutting-edge, but believable tech.

> ...there wasn't a single FPS we saw that really leapt out and grabbed us. The vast majority of them are from well-worn franchises...

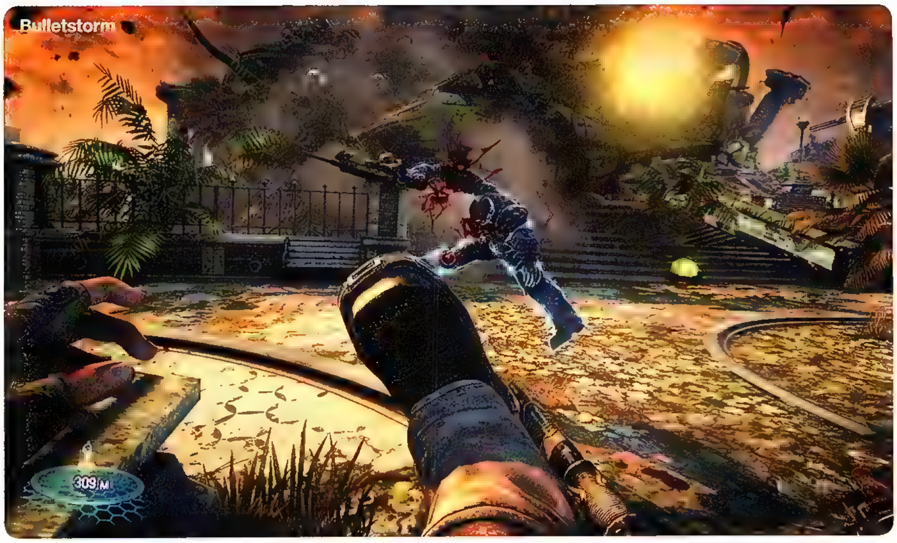
Your assault rifle is a modular weapon equipped for any number of battlefield roles, you'll have access to drone support, battlefield tac-nets, and arguably most impressively, optical stealth technology: effectively making you invisible on the battlefield.

It sounds very powerful, but the AI is looking very solid, and there are counters for some of your neat tech, like the thermal goggles that some enemies wear that can penetrate your camouflage.

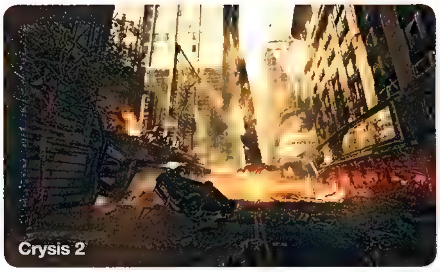
And with four player co-op, all those technologies should make for a really stunning small unit tactical experience.

Goldeneye for Wii looks like a surprisingly deep FPS for the redheaded stepchild of consoles, and features a complete reboot of the original game, including voice acting from Daniel Craig and Judi Dench. We don't think it's going to make us rush out and buy a Wii, but it's an impressive effort nonetheless, with solid AI, and multiple-path environments. Even all the music

Homefront


Bulletstorm

Red Faction: Armageddon


Crysis 2

has been composed by David Arnold, and Daniel Craig's stunt double did motion capture work for the game.

Id's new FPS *Rage* is also looking amazing. As a game engine demo, it's simply the most stunning looking thing we saw all E3. But as a game, it falls short of greatness. Rage has been in the pipeline for years, so it's no fault of id's, but a lot of gameplay looks like stuff we've seen before in *Borderlands*, and the look and feel of the mimics that too, as well as *Fallout 3*. For all the bells and whistles – like the single best lighting engine we've ever seen in a game – Rage is looking like a game that's hard to get *that* excited over.

Except for the eight storey tall beastie that got revealed at the E3 demo's end – that shit looks awesome.

Best of Breed!

Okay, this is tough. Because no one game really leapt out at us over the show, we're really looking deep inside the crystal ball here. We're looking at a game that features a good engine, challenging AI, a story that makes you really want to waste a lot of digital badguys, and a good multiplayer angle if we can get it.

And when you add all that together, the choice becomes clear. The Best of the FPS Breed for E3 2010 has got to be Kaos Studio's *Homefront*.

Coincidentally, it's also our Engine Room feature this month, so you can read all about it on page 82. But since that trip we have learnt a few more interesting things about the game, particularly on the multiplayer side of things. We spoke to David Votypka, the game's Design Director, and he was able to hint that multiplayer would be structured slightly differently from the game's main plot. You'll be playing regular soldiers on both sides, so multiplayer will be showing off a whole other aspect to the game's single player.

Ghost Recon: Future Soldier

It's also going to feature a lot of vehicles, though they're still working out what's going to work best in that regard. Given Kaos' pedigree – they delivered the excellent Fuel of War a couple of years ago – we're expecting a polished online experience.

Homefront's currently dated for February next year, and it's now officially on the Atomic watchlist.

Special Award: Overwhelming gore!

Mortal Kombat

Sheer amounts of gore isn't limited to the FPS genre – there were many games full of gibtastic shenanigans at E3 this year. Nothing compared to the two heavyweights of blood and brains: *Bulletstorm* and *Mortal Kombat*.

It's a tough – and brutal! – fight between the two, but ultimately the bloodiest thing we saw at E3 was Mortal Kombat by the length of a freshly torn out spinal column. Not only are all the classic fatalities back, but now you can use X-ray attacks to see the damage you're doing to every bone and organ.

It's rupturetastic!

But to keep Bulletstorm fans happy – we're guessing they're out there – we're going to give it our Gratuitous Hyperbole Award to it for a single line in the game's presentation...

"It's an orgy of violence, where your condom is a shotgun!"

Classy!

Best Action/RPG Game

If tooling up your gear and hacking monsters in twain is your thing, then E3 had a tasty smorgasbord on offer.

Contenders

Deus Ex:Human Revolution,
Dungeon Siege 3,
War in the North

Mass Effect and Fallout 3 really have a lot to answer for. Not only have such games really raised the bar on RPG storytelling and the impact of choice, but they've also drawn the worlds of action gaming and roleplaying indelibly together. Once upon a time, a computer RPG was a rather static affair, or provided gamers with an incredibly distant viewpoint of the action.

Now gamers expect to be in the thick of it, playing these games in first person or looking over the shoulders of their onscreen avatars, while searching for phat lewts and waiting for that next orgasmic level-up notification.

There were many RPGs at E3 this year. Sadly, one person on the ground can't cover everything, so we only got to spend some quality time with three of the bigger titles.

But there's a whole lot of awesome right here.

Honourable mention

The truth is, all three games have us pretty excited, so it really feels poor form to have to relegate one to comparative obscurity – but, if we're looking at this brutally honestly, *Dungeon Siege 3* has an ever so slight edge over *Lord of the Rings: War in the North.*

Like a lot of the cross-platform games at the show, War in the North was showed off on console – it looks really good, but the fact is we're far more interested in playing a game like that, with strong co-op play and gameplay mechanics that really reward teamwork, on a PC.

The Dungeon Siege demo, by comparison, was one of the few games we saw that used PC code, and it seemed to play far better for it.

This is Obsidian's first partnering with Square Enix, and with oversight from series creator Chris Taylor, it's obvious the entire team wants to return to the game's roots – epic story, solid gameplay, and more epic gear than you can poke a **+25 Sword of Murder** at. So far, it's a success. Even the short demo showed a wealth of gear and really interesting looking Diablo-like gameplay, but with a much closer camera focus to show off the very realistic fantasy setting.

Dungeon Siege 3

Deus Ex

What's more, the team's very dedicated to PC gaming. "We're all PC gamers here, and that's where we think this experience is going to be best. The PC interface lends itself to this kind of game, but the console version needs to be more streamlined," Nathan Davis, the game's producer, told us.

Best of Breed!

It's gotta be *Deus Ex: Human Revolution* all the way.

From the open world where you can talk to everyone on the street, to the incredibly detailed and beautifully designed hardware, and of course the intense action, this is not only our choice for best in class, but *very possibly* best in show.

This is another Square Enix title, and if you read our Engine Room article on the game last issue, you'll know that Square's making a big effort to make a game worthy of Deus Ex (while also conveniently forgetting the disappointment of *Deus Ex 2*). From the footage we saw at E3, it's plain the effort is paying off.

Of particular note is how open the gameplay is looking – as in the original, you can once again complete the game without killing a single person, and each of your goals can be accomplished in any number of ways.

And the cyberpunk vision of the game is superlative. Truly, this might be like one of those games that makes life as a gamer worth living.

Best t-shirt of the show

E3 is usually pretty heavy on the bumpf side of things – free shirts, tote-bags, toys, USB sticks, you name it – but this year it was pretty light.

That said, we did come away with a lot of useless pap from the show. There were iPhone covers, awkwardly shaped flash drives (which sounds dirtier than it actually is), and more lanyards than we can poke a boothbabe at. But one shirt wins supreme.

Square Enix gave out Deus Ex t-shirts after each demo, but this is no mere game shirt. For one thing, the game's name isn't mentioned. Nor does it feature any characters. Rather, it's the staff shirt for a bar that features in one of the demo segments, and that we saw a couple of characters wearing. It's more costuming, than marketing, and we love it.

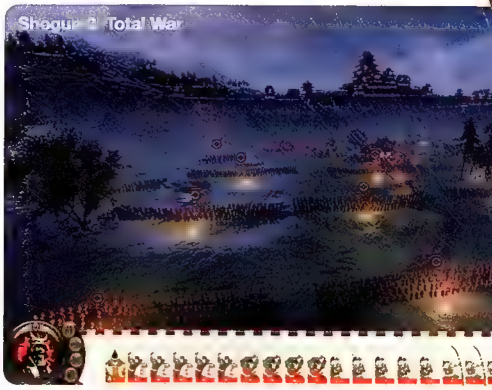
If only it didn't fit us like a tent – when will game companies learn we're not all fatties!

Best strategy game

Two of the biggest strategy properties go head to head – who flanks whom in our E3 report?

Contenders

Shogun 2: Total War,
Civilisation V,
Company of Heroes Online



COHO gets a second shake at a place on the podium here because, despite its free to play, massively multiplayer ambitions, at its heart it is a classic strategy title. And there were few of those on display amongst the big publishers at this year's E3.

That said, what we did see was universally top notch, though again, there's a real dearth of new and unique properties. What we are left with are three franchises that are looking invigorated, polished, and as addictive as ever.

Honourable Mention

If you read Atomic's game reviews with any kind of regularity, you'll know we're total fans of Total War. Its mix of tactical and strategic gameplay in eras as diverse as ancient Rome to 19th century Europe is like gaming crack. The last two efforts, Empire and Napoleon, have both garnered Hot Awards, and we're still enjoying the latter.

So that should give you an idea of how excited we are when we say *Shogun 2* is going to crap all over them both from a great height.

This is, as we were enthusiastically told, the game that Creative Assembly has always wanted to make, and from the first few frames of the demo, Shogun 2 is looking like a totally different game from any Total War game before it. The game engine is now capable of the most minute detail, from rain running over a samurai's armour, to displaying thousands of soldiers and hand-designed trees. Battlefield AI has seen a huge boost, with proper line tactics and archer deployment that's going to make every battle a near run thing.

And on the artistic side, the designers are borrowing heavily from traditional Japanese artworks and poetry to deliver a stunning overall achievement. And we've not even touched on what multiplayer's going to offer yet, though we've been promised that it'll be something that the franchise has never seen before. Colour us excited.

Best of Breed!

Similar to what we said above, if you know our love of Total War, you'll know exactly how much better *Civilization V* must look for it to take out the top strategy spot.

And man... does it look good.

In fact, it's almost a different game entirely. There are two huge changes that are going to have massive impact on how you play. First up, the game's finally gone to a full hex-based map, which affects not only the way you move and fight, but has even cleared up a lot of terrain display issues for the game's engine.

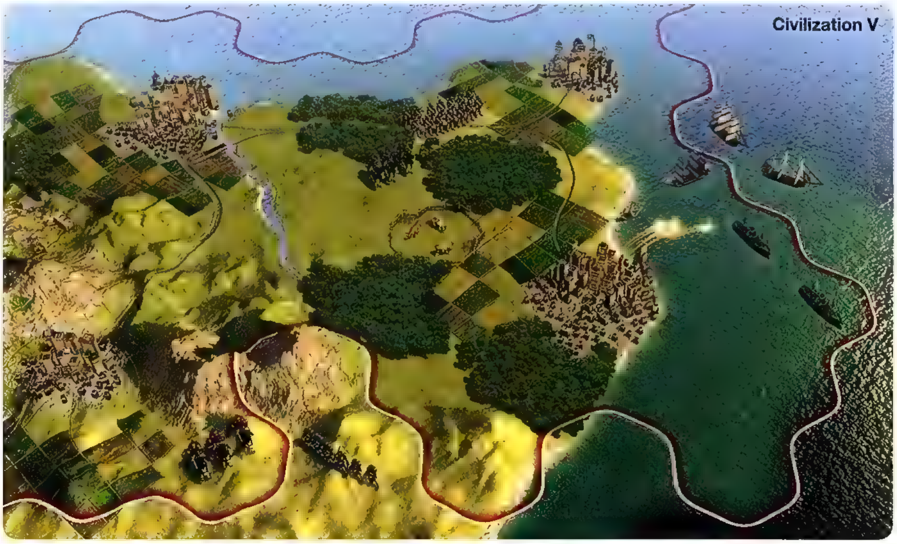
And speaking of the engine, it goes without saying that this is best looking Civ game yet. So we won't say that *(wait, what? -ed)*. Rather, we're going to go a step further and say this is the best looking strategy game overall that we've ever seen *(ohhh! -ed)*. The unit detail, terrain, and even the combat animations make this look more like a simulation than a game of Civ. It's that good.

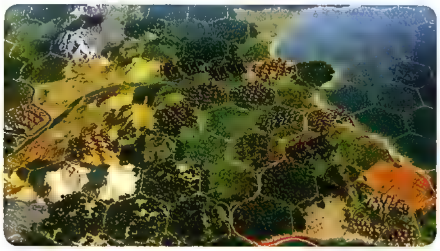
The other big change is to unit stacking – and it's gone! No more stacks of doom burning down every city and army before it. Instead, good unit coordination is key to winning in Civ V, and in multiplayer we're expecting this to make for even more intense games.

And Firaxis is still keeping modders happy. Not only will Civ V be mod friendly in its own right, but gamers will also be able to import maps and mods from *Civ IV*. How cool is that?

Very cool – so much so that Civ V is not just the best Strategy title for the show, but we think it *might* be the best game. Period.

Nice work, Sid.





Best Massively Multiplayer

Another select group of titles sure to generate more dedicated MMO addicts.

Contenders

Lord of the Rings Online,
Final Fantasy XIV,
Company of Heroes Online,
Warhammer 40,000: Dark Millenium

Company of Heroes online

The MMOs we saw at E3 ran a gamut of settings, and covered properties old and new. MMOs live and die by constant evolution and the adding of new features, so it's no surprise to see an established game like *Lord of the Rings Online* with a presence at the show, especially given its recent acquisition by Warner Bros Interactive.

What's more, there's a wide range of settings and genres, from the JRPG stylings of the latest *Final Fantasy* iteration all the way to the curious combination of MMO with RTS in Relic's *Company of Heroes Online*, and different subscription options, with COHO being free to play from the get-go, and Lord of the Rings Online is soon to make it free to play as well.

Interesting times for the MMO ahead...

Honourable Mentions

Relic is adamant that its new Company of Heroes Online, which is already stupidly huge in Korea, is a true Massively Multiplayer game. It's got persistent progression of your leader, ongoing experience-based upgrades, even gear you can get from completing battlefield missions. And sure, there are a bajillion players, but once you get into a mission, it's still going to be the same style of game you're used to from the current iterations of Company of Heroes.

But. And this is a big but.

We caught up with the COHO team after the show, and quizzed them about something which seemed really obvious to us – an overarching strategic layer on top of the tactical game so that much larger campaigns can be fought out. And we were told it's coming.

Want to refight the entire WW2 Western Front, with each player commanding a company level battlegroup? Soon, you can.

And that's what makes us stupidly excited about COHO – then it will be truly massively multiplayer.

Best of Breed!

You know, it says something about how little we got to see of *Dark Millennium* that it's been beaten by a game that's been out for years. But the huge changes coming to Lord of the Rings Online are going to make it even more accessible to a range of new players.

Later this year it's going to become free to play, allowing anyone to play to up to level 22, enjoy the epic campaign, and generally faff about pretending to be an elf. Which, considering that's how we like to relax, there's nothing wrong with faff! Unlike Turbine's other free to play MMO, *Dungeons & Dragons Online*, however, the LotRO crew is adamant that the game experience still retain the same quality it always had – you'll never have to buy better weapons or equipment, and current players can drop down to free play and not lose one bit of gear.

What's more, the pricing options for new content packs – which will each deliver one new region of Middle Earth – are very competitive. At the moment it's looking like each pack will cost around $US5, and there'll be added bonuses for those who still wish to subscribe.

We've maintained for some time that Lord of the Rings Online is one of the premium MMOs on the market, and with this move, the game's becoming an even better proposition. Bravo Turbine and Warner Bros.

Lord of the Rings Online

INTERVIEW

Dichen Lachman Interview

Justin Robinson speaks with Sierra of Dollhouse fame at Sydney's Supanova expo.

atomic Dichen, you started out on Neighbours, so what's it like working on Dollhouse a very different show to your average aussie soap?

Obviously we had a lot more time, on Neighbours we'd shoot 25 pages a day, Dollhouse we're shooting at most eight, maybe nine pages – which, you know, is a big difference. There was a lot more time to work on the material. I love Neighbours and I loved the family situation, it was a really safe place to learn and cut my teeth, but Dollhouse let me push the boundaries because of the nature of the time slot and the audience – we got to do some really cool stuff that you don't normally do, whereas Neighbours is day-to-day life. Most of it is really the same: you learn your lines, you go to set.

atomic So what was it like playing different characters on a per-episode basis? Or even different characters within an episode?

It was amazing! When I auditioned for Dollhouse there was something else I was very close to getting but all my friends, myself included, were like "this Dollhouse show is like an actor's dream." To be on a show but have the freedom and ability to play different characters and to be those people, you couldn't ask for a better situation. Of course, I'm not saying it wasn't challenging at times. There were nights where we would get a scene and we'd have to be doing an accent and a completely different character and we'd only have a couple hours to prepare before we had to go to sleep and wake up and go to work and do it, and that was extremely challenging. But I mean, what better way to learn how to work quickly?

It was the best experience of my career so far in the sense that it was so challenging. It was constantly like having the rug pulled out from under you, and you just have to scramble and get back up. It's rare that that happens on television; usually you get into a character and you're playing that character for the next five, seven years if you're lucky. I would imagine that becomes second nature and it's not creatively challenging.

atomic Do you have a favourite moment from filming the two seasons of Dollhouse?

That's easy! It's the friends I made on that show, they're like my family. I never thought that with such an amazing opportunity would also come such friendships. Usually it's just the amazing opportunity, or you make friendships. There was nothing missing from that situation except the audience. I mean we have an audience and we're grateful for that, but the actual measurement of the audience wasn't there. Other than that it was awesome, it was the best time of my life.

atomic What's it like working with Joss Whedon?

It's incredible, he's Joss Whedon! He's sort of like a God, he's so highly intelligent and I can't even articulate how talented he is. He has it all; a loving family that he cares about, he has the talent, he has the friends. When I was invited to his house to do a Shakespeare reading, Alan Tudyk, Nathan Fillion, Neil Patrick Harris were there and all these people from Buffy and Angel. I grew up watching them on television! It's so surreal. He has wonderful people around him and not only do I feel like he gave me an opportunity which has put me on a path that I did not expect, but I'm very grateful for the fact that he welcomed me into his family.

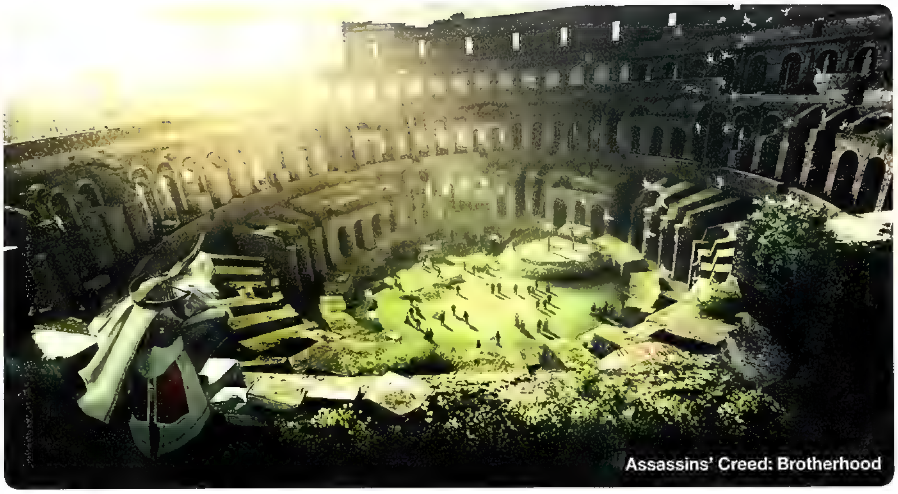
atomic Is there anything in particular that you'd like to do next?

Best Multiplayer

Fragging your friends for fun and achievements.

Contenders

Medal of Honor, Driver: San Francisco, Assassin's Creed: Brotherhood, Goldeneye for Wii, Dungeon Siege 3, War in the North


Assassins' Creed: Brotherhood

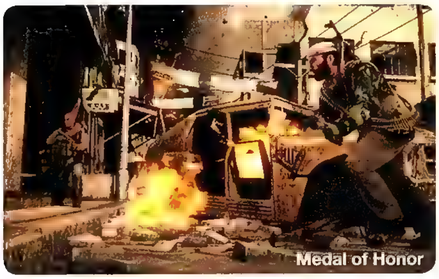
Rare is the game these days that relies solely upon the singleplayer experience to keep players hooked. Whether it's online competitive play, local co-op, or split-screen fun on a console, there are few better things in life than gaming with mates.

In fact, there were a similar range of multiplayer offerings at the show this year, from a similarly wide range of settings. Whether you like racing, modern combat, or cutting sick with a sword and shield, the next 18 months of gaming is going to have something for you, especially considering there were many titles this year that weren't even showing multiplayer (hello *Ghost Recon!*), and most of those that did utilised console code. A lot of these games are going to get even better on PC – assuming we don't see any more repetitions of the *Modern Warfare 2* debacle...

Honourable Mentions

Say what you will about *Driver: San Francisco*, it is totally crazy. "You're in a coma but don't know it" is the mechanic for its singleplayer game (like the plot of a daytime soap opera), but until you've played Driver's multiplayer, don't discount it.

If you're unaware of the mechanic, you can kind of go into a disembodied state and jump from car to car. Yeah, it reads really goofy, but in reality it's a truly unique take on multiplayer racing. Don't like your current race position? Switch cars. Feel your car is too slow? Get a faster one. Don't like the race leader? Hop into oncoming traffic and set up a killer head-on collision.


Medal of Honor

Goldeneye Wii

And that's just the tip of the iceberg. It sounds odd, but a lot of effort has been put into keeping it balanced. And it's working – Driver was one of the most fun things we played this year.

For a completely different feel, we're really looking forward to the co-op play in *War in the North*. And not just because of the great Lord of the Rings-type action, with classic warrior, archer, healer-style class interplay, or what looks like a robust loot and inventory system ('cause we love opening chests full of gear!).

No, the thing we like most are the racial abilities that can only be seen by the player in question. An elf, for instance, has keen enough eye sight to be able to easily spot tracks, which often lead to new enemies or treasures. This promotes close teamwork and communication, which is something too often lacking in games like this.

And it's pretty flavoursome to boot. Want to see more of this one.

Best of Breed!

We're almost embarrassed to admit this... but the best multiplayer we saw at E3 was *Assassin's Creed Brotherhood*.

We're still not entirely convinced by the game's story arc, and we were a little wary of just how the game would work in multiplayer. The game has a very set pace and feel, one that seems out of step with most frenetic online kill-fests. However, Ubisoft has turned that into a feature, creating what may well be the first game where you'll feel excited about sitting on a park bench waiting for your mark to walk by.

Seriously, the game mode we played forces you to play it calm, as only by considered and careful movement can you hope to approach your target without alerting them. Run, and they may get spooked. Hell, run, and you may spook another player, who's likely – since no one knows who's gunning for them, only their actual targets – to kill you on the off-chance.

Combined with Assassins' Creed's freerunning gameplay, and you have a game that's tense and thrilling by turns.

And that's just the one mode we played. Ubi deserves some serious respect for thinking very far outside of the box.

More E3 Coverage

If you want to know a bit more about these games, or check out our at-show galleries, head along to our website. Specifically, point your clicks at **http://www.atomicmpc.com.au/Topic/215423,e3-2010.aspx**

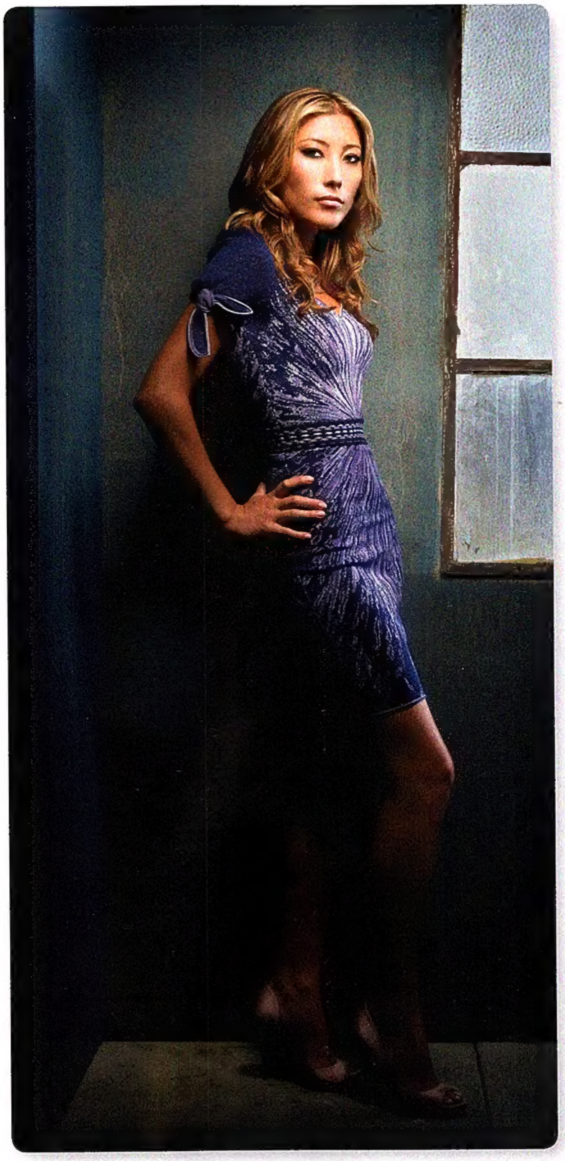
There are live reports from a couple of the early press conferences, stand-by-stand write ups of everything we saw, played and had demoed at us, trailers, and more news than you can poke a Kinect at. We're still writing up our E3 reports as we type this! Until next time.

I'm a huge sci-fi fan and I'd love to make a niche for myself in the genre in film. You know, I tend towards the dramatic side of things but I would love to do a really cool, awesome big movie. If I got that I would be on set 24 hours a day, seven days a week. I love it, such a wonderful energy, so we'll see what happens.

atomic Do you have a favourite comic, or a favourite series of sci-fi?
I loved Firefly. It was such a shame that it didn't keep going; it is probably one of my favourite shows. I didn't even know about it until I became part of the Whedon world. I knew Buffy and Angel and all of Joss' other stuff, but I hadn't tapped into Firefly yet – I just couldn't stop watching it! I think in 24 hours I watched every episode! As a kid I grew up in a third-world country until I was eight and there used to be some Archie and Jughead comics lying around, but the Christopher Reeve Superman movies were our staple and there was a Supergirl movie we watched over and over again. We only had access to a few movies, being in Kathmandu, so I think I saw Police Academy a million times! The Batman reinvention is just phenomenal.

atomic Have you thought about maybe getting into videogames at some point in your career?
I wanna be [the character from] Mirror's Edge in a movie, because I think I look like her! I know it's a computer game, but I think it'd be awesome to be a freerunner. I hope someone adapts it and I get the opportunity to do the wig and the makeup – I think it'd be really cool. If there was an opportunity to get into the gaming world for voiceovers or anything I would love that! That would be awesome, are you kidding? Just waiting for the opportunity to happen.

atomic Thanks for your time.



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My name is [you] and I'm a gamer

What made *you* a gamer? What was your original 'OMG' moment that sucked you in? **Ben Mansill** seeks the tipping point when you accepted the Lord Gaming into your life.

It could have been one epiphany of a moment that clicked when you saw something awesome in front of you. An unplanned moment that registered with something personal deep inside. Or it could have been a gradual 'getting into it', worn down by exposure via friends or at home. It could have been a combination of things, or one single powerful draw.

There are a few clear common themes, or gamer personality types, that probably bumped into your life and made you a gamer. Perhaps a single one of them, or a combination, or others that aren't thought through here. Where do you fit?

The Fantasist

You're intensely passionate about something cool and exciting. You think about it, read about it, talk about it. Gaming lets you do it. Most often via simulations of one sort or another. Many, many gamers enter the world this way. The thing you love could be motor racing, and with virtually every car and track that exists in reality available in a sim, all your fantasy needs are met.

You may love the metal bird, and dream of flying the skies. There's not a plane made that can't be flown as a sim, even out-there experimental models that made no real-world sense. And of course we now have every bit of the entire world ready to load up and fly to.

Sports could be your big thing, daresay a few games of FIFA were played last month…

With the world a military state and Iraq and Afghanistan on everyone's mind it's not hard to see why Modern Warfare 2 reached out to those keen to bathe a little deeper in more.

I like all those, and am also partial to being the boss of the universe, a benevolent one where science rules and trade is bountiful. No shortage of 4X games to help there…

The Escapist

There comes a time when we just need to shut out the world for a block of time. For some that feeling comes every now and then, for others at the end of every single day. Some people are escaping a bad day, or life. Others just like the thrill of existing for a time in another plane of reality. Escaping is one of the most powerful natural inner drives, and that's cool.

Gaming offers a superior escape. The cost is usually less that drugs or booze, certainly less damaging. Yet gaming delivers a complete removal from the everyday world. When you're in a game you love there's simply no room to think about anything else. The nice thing about gaming as an escape is that once you turn off the game, you're straight back into the real world – assuming you ever manage to leave it.

The Can't Escape It

Your Dad loves his gaming, and when you grew up there was always the latest console, or flash new PC gaming going on. Your mates would get together after school or work and play the latest. Maybe you fell in love with a gamer. However it happened, it wasn't part of your original plan.

You didn't hate gaming, and it seemed kinda cool. You played to be in amongst the scene, whether friends you liked to be around, or family, with whom a bout of gaming really was quality togetherness.

Then one day you woke up and all you wanted to do was continue last night's saved game. Nothing else mattered. The point had tipped, you were in and always would be.

The Technologist

Immersion means getting as close to inside the machine as possible. While you're fragging you're also visualising the graphics pipelines churning like little watermills. You feel the CPU and its load as easily as you feel tired or energetic yourself. A game is amazing software that lets your machine run like a sports car on a nice road or a horse in a field. You're in it for the ride, not the destination.

The Game Beater

The mission is to understand the game mechanics better than the developers themselves do. You will be the supreme master of every game you choose to take on. Over and over you play, the fun coming from each incremental step up in understanding the way it works, and what works to beat it.

A game will be played to death, shelved, then probably returned to a few weeks or months later for that most brilliant feeling of stepping up to a game that's been gathering dust and smashing it utterly first go. Poor game was probably feeling relaxed, all the little game machine people inside thinking "Well I'm glad that's finally over", then blammo, along comes God again to let 'em know who's boss.

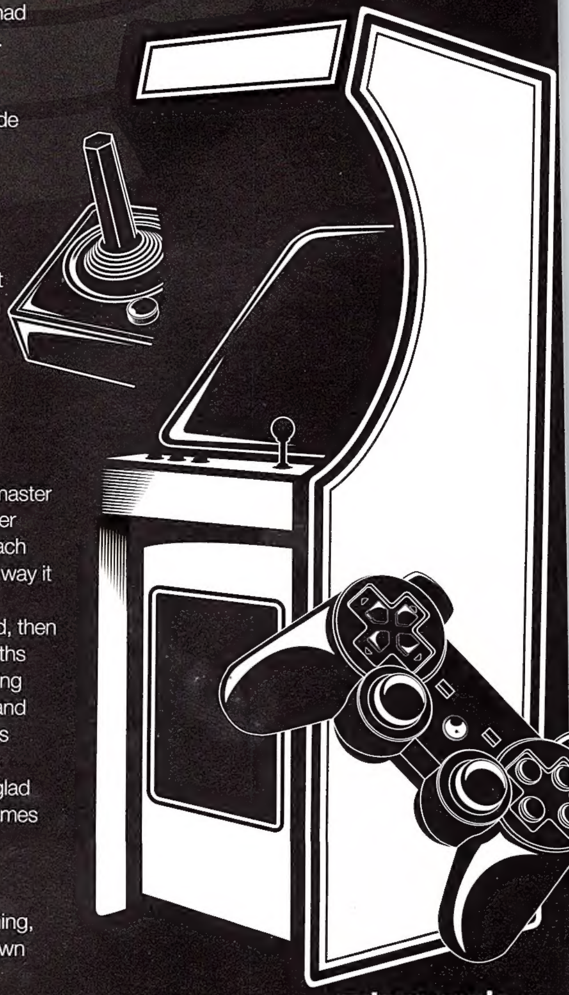
The Teamster

Some quirk of fate drew this type to gaming, when they'd have been just as easily drawn to football. Amongst it are the guys battling a common enemy, the power of many working in harmony to be greater than the sum of its parts, and you're right there beside them being all indispensible and legendary.

Team dynamics are either loved or hated, you may get a huge kick out of adapting your play style to fit in with the team's needs, or you may be a frustrated leader bitching about everyone else's bad move, but either way you need to be a bee in the machine, excelling and living on the adrenalin edge.

All of the Above, and More

It's nice to understand why you love something, but often it's even nicer to not analyse. Just enjoy.



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